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AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

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VOLUME 18 NUMBER 4 / FEBRUARY 23, 1980

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) 411

02 AERODYNAMICS 411

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

03 AIR TRANSPORTATION AND SAFETY 414

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 414

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 415

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 417

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER 418

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 419

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 420

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*.

12 ASTRONAUTICS (GENERAL) 421

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS 430

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) 431

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 431

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 432

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING N.A.

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 433

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION 433
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER 434
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 435
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 435
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 437
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS 441
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 446
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 450
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) 454
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 456
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 459
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER 465
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 471
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS 472
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 475
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 478
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 480
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) 484

43 EARTH RESOURCES 492
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION 496
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION 508
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 509
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 513
Includes weather forecasting and modification.

48 OCEANOGRAPHY 515
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 516
Includes genetics.

52 AEROSPACE MEDICINE 516
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 517
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 518
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 519
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 521
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 525
Includes computer networks.

63 CYBERNETICS 526
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 526
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 528
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 531
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 531
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) 531
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS 531
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS 533
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 535
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS 537
Includes light phenomena.

75 PLASMA PHYSICS 539
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS 540
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS N.A.
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

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Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) N.A.
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 546
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 546
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS 546
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE N.A.
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 546
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 547
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 548
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 549
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 550
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 551
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

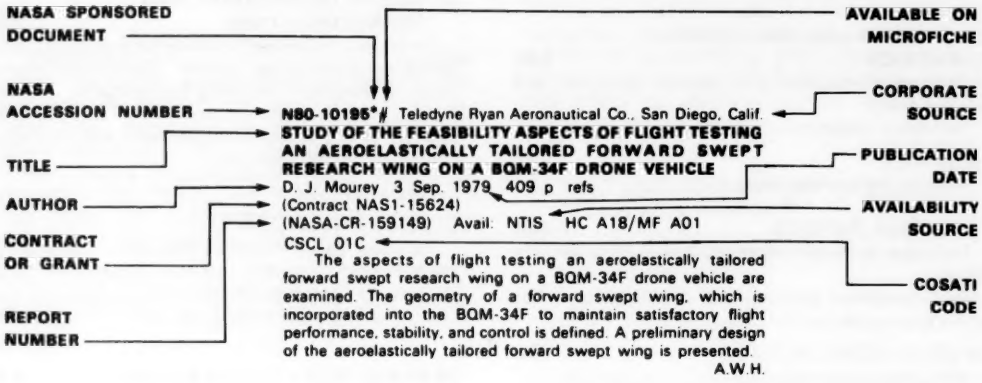
GENERAL

99 GENERAL N.A.

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-53
CORPORATE SOURCE INDEX I-59
CONTRACT NUMBER INDEX I-73
REPORT/ACCESSION NUMBER INDEX I-77

TYPICAL CITATION AND ABSTRACT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TITLE
STUDY OF THE FEASIBILITY ASPECTS OF FLIGHT TESTING AN AEROELASTICALLY TAILORED FORWARD SWEPT RESEARCH WING ON A BQM-34F DRONE VEHICLE
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The aspects of flight testing an aeroelastically tailored forward swept research wing on a BQM-34F drone vehicle are examined. The geometry of a forward swept wing, which is incorporated into the BQM-34F to maintain satisfactory flight performance, stability, and control is defined. A preliminary design of the aeroelastically tailored forward swept wing is presented.
A.W.H.

ON-GOING RESEARCH PROJECTS

This is a listing of research projects - not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research and Support Facilities (air). For Related Information See Also Astronautics.

1.0001, AUTOMATIC LAUNCHING/LOADING TECHNIQUES - HELICOPTER SYSTEMS

G.T. Lamar, U.S. Dept. of Defense, Army, Missile Research & Development Command, Technology Lab., *Redstone Arsenal, Huntsville, Alabama* 35809 (DA0G1009)

Investigate the depot-to-fire sequence of future systems and develop transport-load-launch-reload concepts minimizing manpower requirements and total sequence time for helicopter launch systems.

A full study of the techniques for rapid load and reload of helicopters will be conducted. Automatic boresighting features, self-loading hardback design, rough terrain loaders and techniques to satisfy the complete wooden round philosophy will be investigated. A tri-service/NATO survey will be conducted. Prototype hardware of promising concepts will be designed, developed, and tested.

SUPPORTED BY U.S. Dept. of Defense, Missile Research & Development Command, Ground Equipment & Missile Structures Directorate

1.0002, EXPEDIENT SNOW ROADS AND LANDING FIELDS

P.R. Johnson, U.S. Dept. of Defense, Army, Corps of Engineers, Cold Regions Research & Engineering Lab., *Bldg. 4070, Fort Wainwright, Alaska* 99703 (DA0D8149)

To evaluate the effectiveness of roads and landing fields built of snow while minimizing damage to the underlying vegetation and investigate constructing snow roads and landing fields in low snowfall areas using snow collection and entrapment methods.

In the subarctic, work will be concentrated on methods of compacting the light cold snow so as to develop a snow pad with adequate strength and surface characteristics to carry medium to heavy truck traffic. Existing snow roads will be studied. In the arctic, special attention will be given to snow supply and induced drifting along with the terrain, snow and traffic characteristics. Methods of collecting and transferring snow on the tundra to the desired roadway will be examined and tested. Ice roads, constructed primarily of water applied to the tundra will be examined. The protection offered the vegetative mat and ground below the various snow and ice roads and pads will be evaluated during the following summers.

SUPPORTED BY U.S. Dept. of Defense, Corps of Engineers, Cold Regions Research & Engineering Lab.

1.0003, COMBUSTOR DESIGN CRITERIA, ARMY AIRCRAFT

K.M. Johansen, Signal Co. Inc., Airesearch Manufacturing Co, *402 S. 36th St., Phoenix, Arizona* 85034 (DA0D4007; DAAJ02-75-C-0044)

Combustors have typically required more rig test development time and cost than other gas turbine engine components. Though combustors have been the component least amenable to analytical design, recent techniques have shown the potential of significant reductions in development time and cost. Analytical math models will be refined and validated by full-scale rig tests of a small (2-5 pps) annular combustor. This technology will provide a shorter, lower cost development cycle for future Army gas turbine helicopter engines.

Existing combustor math models will be refined and validated by elemental testing, i.e., fuel injection, liner cooling. Full-scale high pressure rig tests will validate the entire design procedure. The following phases (and percentage of total effort) will be conducted: (1) analytical model refinement (33 percent), (2) full-scale combustor design, fabrication, and preliminary test (38 percent), (3) combustor performance mapping (20 percent), (4) limited modification and retest (9 percent).

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

1.0004, MIRA INERTIAL SENSOR FAILURE, REDUNDANCY ANALYSIS

J. Craig, Incosym Inc., *21243 Ventura Blvd., No. 138, Woodland Hills, California* 91364 (DF140400; F33615-77-C-3015)

Present inertial reference units are costly to procure and maintain. Complement the on-going multifunction inertial reference assembly (MIRA) program in the determination of the final MIRA candidate designs. Assist the Air Force in the selection, evaluation, and approval of the final MIRA designs. Successful implementation of the MIRA concept to military aircraft would result in replacement of numerous conventional reference sensors, and a life cycle cost savings of fifty percent.

This investigation will determine and specify MIRA candidate configurations. To accomplish this, analyses of the failure modes of the MIRA system components and their effects on the various possible mechanizations will be performed. Possible redundant mechanizations will be analyzed to establish the most cost effective MIRA configurations with consideration of life-cycle-cost, performance, reliability, maintainability, and survivability.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0005, EJECTION SEAT FOR HIGH G ESCAPE

O.E. Howland, McDonnell Douglas Corp., *3855 Lakewood Blvd., Long Beach, California* 90808 (DF142060; F33615-78-C-3416)

Advance flight vehicles incroporating new technologies such as low profile cockpits or control configurations which permit direct lift, direct side force and drag modulation, and reduced margins of stability, require a new and different type of escape system. With these types of aircraft, a typical aircraft emergency will characteristically include a high g field while the ejection takes place and the additive effect of aircraft g and ejection accelerations will exceed the limits of human tolerance. The objective of this program is to provide an emergency ejection seat type escape system design that will provide safe ejection and clearance while the combat aircraft is under high g as well as safe escape under the usual severe requirements associated with high dynamic pressure and low altitude flight regimes.

This program consists of 1) an investigation phase to gather together and evaluate pertinent technologies, requirements and information related to the problem, 2) synthesis phase to establish reasonable concepts and a preferred conceptual design, and 3) a reporting phase to document activities, results and rationale.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0006, EVALUATION OF THE IMPACT OF TOWING TRANSPORT AIRPLANES AT BOSTON LOGAN AIRPORT

Unknown, McDonnell Douglas Corp., *3855 Lakewood Blvd., Long Beach, California* 90808 (FA78WA-4198; FA161582 (TRAIS NO.))

The towing loads at the Boston-Logan Airport, or other airports as designated will be measured as well as the resultant loads and/or stresses in an airplane structure. These measurements will be conducted to obtain parametric data so that the results can be applied to any towing operations at any airport. Also three-loads models for each airplane specified will be developed citing the history of the loads on the nose landing gear and support structure. Critical structural members of the nose landing gear and support structure will be identified and analyzed.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

1.0007, ADVANCED REPAIR TECHNIQUES FOR LOWER COST

D.E. Parker, Rockwell International Corp., *International Airport, Los Angeles, California* (DF141300; F33615-78-C-3208)

An important element of the overall maintenance and repair of a weapon system is the refurbishment and/or repair of structural components. Frequently, excessive costs arise due to either basic structural design deficiencies or inadequate/outmoded repair methods. The objective of this effort is to devise innovative structural concepts and repair/maintenance techniques for selected high cost maintenance items to decrease both frequency of repair and cost.

Specific critical airframe and ground support equipment, maintenance items from fighter, cargo/tanker, or bomber aircraft will be selected for development of improved design and/or repair techniques. The lower cost potential of these techniques will be demonstrated through prototype applications and the approach will be documented for possible AFLC implementation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0008, IMPROVED FLOW VISUALIZATION BY USE OF RESONANT REFRACTIVITY

D. Bershader, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (DF038630; AFOSR-74-2670)

AF function - aerospace vehicles. Opportunity - Air Force flight operations depend on the science of aerodynamics for the quantitative prediction of performance and loads on vehicle surfaces, both for operational use and especially for rational design. Optical methods such as shadowgraph, schlieren and interferometry are important and long established tools of experimental aerodynamics. There is a need for obtaining highly increased sensitivity in these refractive optical methods. With the use of laser sources, resonant refractivity should provide this needed highly increased sensitivity in refractive optical systems. Objective - to develop a resonant refractive system for air and to demonstrate its use with a simple flow field. How work contributes -this work will investigate the feasibility of using the resonant refractivity of sodium or other vapor to enhance the sensitivity of optical flow measurements by a factor of 100.

Theoretical and experimental graduate study and post-doctoral research are being done to provide a feasibility assessment and design recommendations for using resonant refractivity of sodium or other vapor to provide flow visualization for very weakly refractive flows.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

1.0009, ADAPTIVE ANTENNA ARRAYS FOR AIRCRAFT COMMUNICATIONS

B. Widow, Stanford University, School of Engineering, Dept. of Electrical Engineering, *Stanford, California* 94305 (DN890084; N00019-78-C-0276)

Novel adaptive techniques for processing antenna array signals will be investigated. The overall objective is to develop and determine the usefulness of several schemes for separating incoming signals by power level, spectral characteristics, angle of incidence, etc., to demodulate and identify such signals and to do this with a sparse and irregular receiving array.

Emphasis will be directed toward the investigation of a 'leaky' least mean square (lms) algorithm. The leaky lms algorithm appears to offer unique advantages for achieving antenna adaption under conditions where the antenna elements change their spacing due to antenna movement such as occurs for elements mounted on aircraft wings. The leaky lms algorithm will be studied to determine stability, rate of learning, maladjustment, and demodulation distortion in the presence of broadband noise and narrowband signal inputs.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0010, ENVIRONMENTAL EFFECTS AND DURABILITY EVALUATION OF ADVANCED COMPOSITE STRUCTURE

H.T. Lund, Summa Corp., Hughes Helicopters Division, *Centinela Ave. & Teale St., Culver City, California* 90230 (DA0E3836; DAAK51 78 C 0004)

The objective of this work is to develop and fabricate full-scale flight worthy OH-58 tail sections (tailboom, horizontal stablizer, vertical fin) and fly them on service helicopters in place of existing metallic components. The composite tail sections will be flown and maintained under actual service conditions to evaluate the long-term effects of exposure to the natural elements (i.e. heat, cold, moisture, ultraviolet, etc), coupled with daily service usage.

The initial work will be the development of preliminary design concepts to improve structural performance and reduce fabrication cost. In addition to improved structural designs, the composite tail section will include reasonable design modifications and innovations to enhance ballistic survivability when impacted with 23mm HEI and reduced radar detection. Selection - selected tail section design will be fabricated and tested (both laboratory and flight demonstration) prior to quantity fabrication of tail sections and subsequent service installation and environmental/durability evaluation.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0011, DEVELOPMENT OF FLIGHT CONTROL SYSTEMS/FLYING QUALITIES CRITERIA FOR LIFT/CRUISE FAN V/STOL AIRCRAFT

D. McRuer, Systems Technology Inc., *13766 S. Hawthorne Blvd., Hawthorne, California* 90250 (DN881486; N62269-78-C-0129)

To establish baseline flying qualities requirements, flight control laws, flight path critical displays and control/propulsion integration concepts for a Navy lift/cruise FAN aircraft. Supports work unit DH820, DN881124.

Investigations will be conducted to define flight control requirements for a lift/cruise FAN vehicle. Flying qualities criteria will be established for the design of a flight control/display system suitable for all modes of flight including hover maneuvering, transition maneuvering, cruise maneuvering, takeoff and landing. The flight control development will address integrated propulsive and aerodynamic control concepts, failure mode effects, pilot station controls and displays, actuation concepts and system reliability. The ability of the flight control/display

system to provide satisfactory flying qualities will be demonstrated through piloted simulation at the NASA Ames Research Center.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

1.0012, AERONAUTICAL TECHNOLOGY, TECH AREA I - AERODYNAMICS TECHNOLOGY
I.C. Statler, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Aeromechanics Lab., *Moffett Field, California* 94035 (DA0B5001)

This project provides for technological development in rotary-wing fluid dynamics, acoustics, dynamics, stability, controllability and handling qualities where deficiencies are known to exist in meeting the requirements of future Army airmobile systems. Objectives are to develop handling quality design goals and performance criteria in terms required in future systems and to allow knowledgeable tradeoffs to be made among pilot workload, task performance and cost. This effort will lead to new design criteria and a revised handling qualities mil spec for helicopters. It is intended to contribute not only to the improvement of capabilities in industry, but also to the development of the Army's in-house ability to assess the potential of new systems against predicted requirements.

These objectives will be reached through joint participation with NASA in theoretical and experimental research programs utilizing wind tunnel, ground-based simulation, and flight research capabilities.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Aeromechanics Lab.

1.0013, IN-HOUSE LABORATORY INDEPENDENT RESEARCH PROGRAM (ILIR)- ROTOR ACOUSTIC RESEARCH
I.C. Statler, U.S. National Aeronautics & Space Admin., Office of Aeronautics & Space Technology, Ames Research Center, *Moffett Field, California* 94035 (DA0D5002)

The objective is to make maximum utilization of the information inherent in the radiated aerodynamically generated noise signature of rotors obtained by the newly developed in-flight noise measurement technique. These measurements provide noise pressure signals undistorted by reverberation, Doppler shift and other normally prevalent signal distortion mechanisms. These research efforts should provide the understanding of the noise generation mechanisms necessary to develop relatively simple mathematical analysis which can be used for rotor noise source and radiation pattern prediction.

A combined experimental theoretical effort will be followed utilizing tools developed to separate the noise generation mechanisms and allow concentrated effort to solve the complex problems in a step by step fashion. The first effort will be to define the impulsive noise generation mechanism and provide theoretical prediction capability. The second phase will concentrate on the blade vortex interaction noise and determine influence of rotor blade geometric parameters on rotor noise. Model rotor experimental efforts will utilize the laser velocimeter and other techniques such as schlieren and shadowgraph to verify flow field disturbance patterns.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Aeromechanics Lab.

1.0014, RESEARCH IN AERODYNAMICS
I.C. Statler, U.S. National Aeronautics & Space Admin., Office of Aeronautics & Space Technology, Ames Research Center, *Moffett Field, California* 94035 (DA0C5002)

To expand the technologies in those areas which are most likely to impact improved operational and cost effectiveness, survivability and safety of future Army airmobile systems. Analytical and experimental studies are selected on the basis of a continual review of the Army's aviation objectives and assessment of those fundamental technological deficiencies which would prevent achievement of the desired objectives.

Rotary-wing research will be conducted through joint participation with NASA to develop or improve analytical tools, prediction techniques, and fundamental understanding related to basic fluid mechanics, rotary-wing airfoils, acoustics, rotary wing dynamics and control, and flight simulation.

SUPPORTED BY U.S. Dept. of Defense, Aviation Systems Command, Ames Research Center

1.0015, ADVANCED DRIVE SHAFT ALIGNMENT INDICATOR PROGRAM - ARMY HELICOPTER
R.B. Bossler, Kaman Aerospace Corp., *Old Windsor Rd., Bloomfield, Connecticut* 06002 (DA0L4090; DAAJ02-77-C-0006)

To design, fabricate, field test and evaluate an advanced drive shaft alignment indicator (DSAI), for both static and dynamic modes as a candidate replacement for the present UH-1 and AH-1 drive shaft alignment indicator.

An advanced DSAI, based on a prototype indicator designed under a previous contract, will be fabricated. An optimum procedure using the current UH-1 alighment tools will be developed. The new DSAI along with this optimum procedure will be field tested and evaluated. At the conclusion of the field tests (approx. 55 helicopters), the previously developed AVUM procedures will be updated and a final cost and operational effectiveness assessment will be made.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

1.0016, ADVANCED COMPOSITE UTTAS ROTOR HUB PRELIMINARY DESIGN
E. Olster, United Technologies Corp., Sikorsky Aircraft Division, *N. Main St., Stratford, Connecticut* 06602 (DA0E3784; DAAJ02-77-C-0056)

Conduct a preliminary design and determine the merit of an advanced composite main rotor hub for the UH-60A (UTTAS) helicopter.

Contractor will first establish design criteria and specifications for a flight-worthy composite main rotor hub for the UTTAS. Three design concepts which make maximum use of existing rotor system components will be developed and then a tradeoff study will be performed. One concept will be selected and a preliminary design prepared. The following analyses/estimates will be performed - damage tolerance, preliminary structural vulnerability, reliability, RCS, cost-weight, producibility, and lightning protection. Upon completion of the preliminary design evaluation a program review will be held at this laboratory.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0017, FLAMMABILITY STANDARDS - CABIN CREW UNIFORMS
Unknown, U.S. Dept. of Commerce, National Bureau of Standards, *Washington, District of Columbia* 20228 (FA78WAI-865; FA161224 (TRAIS NO.))

Provide the technical expertise and services in fabrics, textiles, and uniforms needed by the FAA to support the promulgation of flammability standards for air transport crew uniforms.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

1.0018, TOWER CAB DIGITAL DISPLAY (TCDD) REVISED CIRCUIT BOARDS
Unknown, Magnavox Government & Industries Electronics Co., *1313 Production Rd., Fort Wayne, Indiana* 46808 (FA78WA-4202; FA161443 (TRAIS NO.))

Tower Cab Digital Display (TCDD) Revised Circuit Boards involve revising fine printed circuit board types and producing fourteen sets of the new boards. These changes will be reflected in the TCDD Instruction Books and provide the updated layout drawings for those boards, displaying the new parts. Once the circuit boards are ready for demonstration, it has to be performed at a site in Tampa, Florida. The circuit

boards have to be designed, constructed and tested according to specifications outlined in TCDD Subsystem Design, while addressing the indicated exceptions.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

1.0019, QUALITY OF SERVICE AND REGULATION IN AIR PASSENGER TRANSPORT

Unknown, Boston College, Chestnut Hill Campus, Graduate School, *140 Commonwealth, Chestnut Hill, Massachusetts* 02167 (OS-70041; OS161028 (TRAIS NO.))

The objective of the research is to identify and implement a rigorous theoretical model of air passenger transportation. The implementation is to be achieved by developing and estimating an econometric model. The focus of this effort will be to determine quality of service and quantity of service as a function of fare structure, entry conditions, cost parameters, and demand parameters. The model will of necessity implicitly include profit and cost-benefit type determinations which may be made explicit. The findings of this research will be of great interest to regulatory and policy makers. It should provide a superior framework for examining the impact of regulatory changes.

SUPPORTED BY U.S. Dept. of Transportation, Office of the Secretary of Transportation

1.0020, MINIMUM-WEIGHT, FAST-REACTION, INTEGRATED INERTIAL SENSOR ASSEMBLIES FOR SHIPBOARD V/STOL AIRCRAFT

R.C. Burns, McDonnell Douglas Corp., *P.O. Box 516, St. Louis, Missouri* 63166 (DN890045; N00019-78-C-0120)

To define and specify a minimum-weight, fast-reaction, integrated inertial sensor assembly for shipboard V/STOL aircraft. High-performance, strapdown laser gyros will be used in redundant configurations, along with air data sensors, to provide inertial and air data for navigation, weapon delivery, flight control, and pilot display functions.

Shipboard air operations, mission scenarios, and performance requirements of Navy/Marine Corps V/STOL aircraft will be studied and analyzed as an essential part of this effort. The information obtained will be used, along with related technical data from other sources, to define performance goals, conduct configuration tradeoffs, and specify an integrated inertial sensor assembly configuration capable of meeting the required operational objectives.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0021, WIRE OBSTACLE WARNING SYSTEM (WOWS)

A. Kleider, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Avionics Research & Development Activity, *Fort Monmouth, Red Bank, New Jersey* 07703 (DA0D2824)

This program has been initiated to provide, at a cost which the Army can afford, a solution to the wire strike problem for helicopters flying nap-of-the-earth (NOE). The objectives include means of detection and recognition compatible with the aircraft lift capabilities, forward speed, and the expected incremental change in altitude required to clear the wire obstacle. The development of a flyable exploratory development model operable under restricted lighting conditions in clear weather is the prime program objective.

Recent developments in monolithic semi-conductor devices called charge coupled devices (CCD) will be exploited in a mode of operation referred to as single site activation (SSA) to detect and recognize wire obstacles. Operating in a combined electronic and mechanical scanning mode, the characteristics of wire are utilized to extract pattern recognition information. The processed video signal is converted to a visual/audible alarm with an appropriate symbolic display. Range data and low light level operation are based upon the synchronous use of a pulsed gallium-arsenide (GaAs) illuminator.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Avionics Research & Development Activity

1.0022, COANDA/REFRACTION EXHAUST NOISE SUPPRESSOR FOR AIRCRAFT HUSH-HOUSES

D. Croce, U.S. Dept. of Defense, Navy, Naval Air Engineering Center, *Lakehurst, New Jersey* 08733 (DN896013)

To develop the coanda/refraction noise suppression concept with specific application to aircraft hush-house exhaust systems. To define a functional configuration for use with all Navy/Marine Corps aircraft.

Conduct an investigative program consisting of breadboard scale-model tests with simulated engine sources, analytic studies and configuration analysis studies. Conduct aero/thermodynamics and acoustic analyses of tests performed with model flat-plate ejectors.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

1.0023, NAVY VEHICLE DESIGN AND CONSTRUCTION - INVESTIGATION OF OPTIMAL CONTROL CRITERIA TO SATISFY FLYING QUALITIES

E.G. Rynaski, Calspan Corp., *1422 Genesses Ave., P.O. Box 235, Buffalo, New York* 14221 (DN875209; N00014-78-C-0155)

The objective of this research effort is to develop linear optimal control system design methods for advanced multivariable feedback flight control systems which will satisfy existing and future CTOL and V/STOL flying qualities requirements. These requirements define acceptable regions of aircraft behavior with respect to pilot command inputs. Future Navy tactical CTOL and V/STOL aircraft will utilize multiple and perhaps unorthodox means of producing forces and moments on the aircraft. The technology of defining control system configurations that will properly use these multiple force and moment producing devices to satisfy specified flying qualities requirements is far from fully developed.

An investigation will be made to determine and exploit the relationship that exists among the performance index parameters and the dynamic characteristics of the resulting closed loop optimal system. The investigation will be directed towards obtaining specific closed form relationships that relate the zeros of the closed loop, multicontroller system to the system's outputs and weighting matrices of the performance index.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

1.0024, NON LINEAR ANALYSIS AND DESIGN OF SUPERSONIC AIRCRAFT

F.J. Marconi, Grumman Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DF140820; F33615-77-C-3126)

A more accurate method for analyzing advanced supersonic aircraft configurations over a wide range of flight parameters is required beyond the present linear methods. The non-linear analysis/design methods will enable handling realistic future military type aircraft geometries. There will be significant acquisition cost savings due to the accuracy and the reliability of the method. The objective of the effort is to generate a user-oriented computer code that gives the aerodynamic parameters of interest and detailed flow field characteristics around the aircraft. Military aircraft not only will have complex geometries but also operate over a wide range of flight parameters. These problems are non-linear in nature and therefore non-linear methods are required to generate reliable data useful for designers.

Cross-sectional geometries of aircraft will be transformed conformally into simpler shapes such as circles and rectangles, and the appropriate non-linear Eulerian equations will be solved by finite difference techniques. Reliability of the schemes will be established.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0025, VTOL AERODYNAMICS

R. Rubel, Grumman Corp., Dept. of Research, *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN775687; N00014-77-C-0524)

The overall mission capability of a high-performance VTOL aircraft depends critically upon optimization of the aircraft characteristics at lift-off. The objective of the proposed theoretical study is to provide a quantitative understanding of

the fluid dynamics of a VTOL aircraft in proximity of the ground.

The overall flow field associated with a VTOL aircraft in the vicinity of the ground will be segmented into a sub-system of coupled, but more simply described regions based on a formal asymptotic analysis. The regions will be characterized as inviscid, boundary layer-like, and strong interaction. The equations appropriate for each individual region will be derived and studied in detail. The subdivision of the flow will follow from the asymptotic analysis as a consequence of the assumptions that the reciprocal of the Reynolds number, the spreading rate of the VTOL jet, and the ratio of the jet diameter to the distance of the VTOL above the ground all approach zero.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

1.0026, COMPOSITE TURBINE BLADES FOR TURBINE ENGINES

I. Ahmad, U.S. Dept. of Defense, Army, Armament Research & Development Command, Research Branch, *Watervliet Arsenal, Watervliet, New York* 12189 (DA0A1708)

Development of high strength filament reinforced superalloy composites suitable for fabricating turbine blade/vanes for Army helicopter engines, capable of performing in the temperature range of 1900-2000 degrees F. This project is in direct support of the Army Aviation Materials Plan.

Composites of silicon carbide (carbon core) filament coated with tungsten and hafnium carbide (or nitride) in FeCrAlY, will be fabricated by diffusion bonding process, and their tensile strength and stress rupture behavior will be studied in the 1500-2000 degrees F range. Application of hot corrosion resistant coatings or composites of tungsten filaments in cobalt alloy matrix will be evaluated, and thermal fatigue of the coated specimens will be determined.

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Benet Weapons Lab.

1.0027, V19U FUZE LETHALITY COMPARISON

M.J. Bittakis, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF141770)

This program will support ongoing laboratory survivability/vulnerability investigations. The vulnerability of a weapons system, when impacted by a cannon round, is a function of not only the incident threat but also the type of fuzing incorporated into that threat. The new threat to be studied deviates significantly from the norm. The objective of the program is to quantify and analyze lethality aspects of the new threat. It will provide sufficient data to establish weapons systems defense concepts for the new threat.

The program will be approached in the following fashion: Phase I will investigate the effects of impact obliquity and incident material thickness on the activation of fuze and high explosive warhead. Phase II will establish the activation delay time characteristics of this type of fuzing. Phase III will compare the lethality of the V19U type threat with certain previously encountered threat types. Phase IV will investigate the results of the different lethality characteristics of this threat. This phase will incorporate a full scale A-7 replica as a test specimen. Inlet duct damage will be the major parameter to be investigated.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0028, HIGH-ANGLE-OF-ATTACK SEPARATED FLOWS

R.B. Crombie, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF140870)

The mission to be supported is FG02, development and improvement of flight control design techniques. Current Air Force fighter aircraft exhibit dangerous stall/post-stall characteristics which limit combat effectiveness and may cause loss of both aircraft and crew. Criteria based on the aerodynamic characteristics of the aircraft is being developed for use in the early design phase of future systems. The objective of this effort is to develop a fundamental understanding of the separated aerodynamic flow associated with high-angle-of-attack dynamic problems thus allowing solutions to be found which will increase combat effectiveness and safety of flight for future fighter/attack aircraft.

Wind tunnel tests will be conducted at AEDC to investigate the high-angle-of-attack dynamic stability characteristics of an advanced aerodynamic configuration.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0029, PRELIMINARY DESIGN OF ADVANCED WING STRUCTURE

A. Gonsiska, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF131620)

The rising acquisition and maintenance costs of advanced aircraft structures present a formidable obstacle to the procurement and operation of future Air Force weapon systems. Development of lightweight, high integrity, low cost airframe structures is urgently required to reverse the current trend of materials and labor cost increases. This effort is to innovatively exploit the latest developments in the field of structures technology to reduce, by at least 10 percent, the costs of advanced USAF strategic bomber wing structures while maintaining or increasing current levels of efficiency and integrity.

A swing wing aircraft (B-1) will be used as the baseline for a preliminary design study to develop innovative structural concepts for advanced system form, fit and function requirements. New structural arrangements, materials and fabrication techniques will be exploited and integrated to establish potential cost and weight reductions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0030, EMERGENCY CREW ESCAPE SYSTEM DESIGN AND PERFORMANCE ASSESSMENT

L.A. Jines, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF136580)

The fatality rate among USAF ejectees from military aircraft is increasing. This is true in spite of many apparent improvements to operational ejection seats. Because of cost and other practical physical limits an ejection seat system is never fully tested. Modifications are then incorporated with similar lack of demonstration of capability. Comprehensive technical evaluation capability needs to be developed to insure that the limited testing is most effective. The objective of this effort is to develop a reliable and valid analytical capability for military crew escape systems to use in design of escape systems, accident investigations, performance evaluations, etc. Extensive effort will also be expended toward the development of a crew escape concept for safe escape while under high acceleration loads.

Emergency crew escape statistics will be analyzed to determine conditions at ejection that possibly indicate a pattern to resulting injuries, fatalities or successes. A companion analysis of current emergency crew escape systems to include effects of individual components on total system performance will be conducted. These analyses will be correlated to define current system limitations and problems. Refined data on the mechanical properties of escape systems will continue to be measured, including aerodynamic properties, weight and balance, force, dimensional and functional data. A computer math model depicting the detailed operation of the system is generated, validated and applied during analyses of various crew escape systems.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0031, FLIGHT CONTROL SYSTEM DEVELOPMENT CRITERIA

T.D. Lewis, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF138620)

Analysis tools to predict aircraft flight control/weapon system performance and cost estimates are inadequate to be applied early in the design cycle. Also, newly emerging flight control technologies require a firm data base and experience factors

to be included in military specifications. The objectives of this effort are to: (1) refine and consolidate the flight control system (FCS) development analysis, evaluation, and life cycle cost (LCC) prediction techniques and (2) develop, refine, and revise military specifications for flight control system design, development, test, and evaluation. FCS specification revisions will incorporate newly emerging technology and aid in reducing FCS design and test time. Consolidation and refinement of analysis techniques will provide criteria for realistic system performance and cost estimates early in the design cycle.

Digital flight control system experience will be broadened through support of the A-7 Digital Multimode FCS test aircraft while in use at the test pilots school, through experience gained on the digital flight control system ADP, and through interaction with work on related programs performed by other agencies for application and incorporation into Mil-F-9490D. Development of a new specification for servo-actuators will continue. Review and update of Mil-V-27162, servovalve specification, will be initiated. Review, refinement, and consolidation of FCS analysis programs such as TAWDS, DIGIKON, MAPS, and FCS LCC prediction will be conducted as applicable. Coordination with AFLC ALC's and the USAF Safety Center will be conducted along with review of FCS safety, survivability, reliability, and maintainability data to establish criteria for future FCS programs and specification update.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0032, APPLICATION OF PHOTOMECHANICS TO EXPERIMENTAL STRUCTURAL ANALYSIS

G.E. Maddux, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF134460)

Accurate stress analysis methods are required to accomplish low cost design, development and maintenance of aerospace vehicles. These are used to secure structural integrity for safety and longevity of a system. The objectives of this effort are twofold. The first is to apply laser/optical experimental stress analysis technology such as holographic interferometry and speckle photography to current design problems. The second is to improve and/or develop new laser/optical techniques with particular emphasis on reducing the cost of design analysis. The expected payoff is an improvement of in-house capability to advance the state of the art and to provide accurate and reliable analysis with a near term impact on systems such as RPV, AFTI, AMST, ASALM, and B-1.

Under a completed exploratory development program (JON 14670212), specialized holographic and speckle photographic methods have been developed and exploited to experimentally validate finite element stress analysis of structural components. This included strain field measurements around interference fit fasteners installed in fatigue resistant structural joints. The current effort will involve application of this technology to composite, bonded, and weld-bonded structures. Experimental studies concerning structural joints and the stress distribution in the vicinity of fasteners will continue. Techniques for using speckle photography on high temperature structures will be investigated. New techniques which might improve accuracy or reduce analysis cost will be evaluated. A quick response in-house capability will be maintained to solve urgent problems that often arise but are easily disposed of using the unique techniques of photomechanics.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0033, DEVELOPMENT OF THERMAL AND FLOW MEASUREMENT TECHNIQUES

D.M. Parobek, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF142430)

Advanced re-entry, interceptor, and maneuverable military flight vehicles operate at speeds which lead to problems with aerodynamic heating. This has generated the requirement to measure the surface heating rate to test models of these vehicles and certain thermodynamic parameters of the flow fields surrounding these vehicles. The objective of this work unit is to develop the instrumentation required to make these measurements.

Specialized measurement instrumentation will be developed in-house with contract assistance as required. Extensive tests on new sensors, probes, struts, and various other measurement instruments such as infrared detectors and scanners will be conducted in the thermal lab and test facilities. Work units 14260116, 14260120, 14260134, 14260135 and 14260213 are in process of termination and the remaining work of these will be consolidated under this new work unit.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0034, SIMULATION OF BIRD IMPACT ON AIRCRAFT TRANSPARENCIES

J.P. Barber, University of Dayton, Research Inst., *300 College Park Ave., Dayton, Ohio* 45469 (DF137660; F33615-78-C-3402)

Air Force flight missions involve high speed, low altitude operations. Under these conditions, bird impacts on aircraft transparent crew enclosures pose a significant hazard and have resulted in unacceptable losses of aircraft and aircrew. The objective of this work unit is to develop math models for bird impact loads on aircraft transparencies. Utilization of existing computer methods for transparency design is contingent upon the availability of such bird loading models. These computer design methods will allow design of transparencies having improved bird resistance and will provide significant savings by reducing the costly empirical development historically required for transparency design. The availability of transparencies having improved bird resistance will reduce, to an acceptable level, the birdstrike hazard to USAF aircraft.

Efforts under this program will include upgrading the test and data acquisition capability of an air gun test facility, validation of an available math model for large bird impact, study of bird attitude effects on impact loads and investigation and validation of a substitute bird material to be used in impact testing.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0035, SERVICE TRACKING AND EVALUATION OF S-3A GRAPHITE/EPOXY SPOILER

C. Foreman, Vought Corp., Vought Aeronautics Co, *P.O. Box 5907, Dallas, Texas* 75222 (DN781395; N62269-76-C-0439)

To closely monitor the usage and performance of composite structure on fleet aircraft in order to evaluate long term durability, reliability, and maintenance requirements of composite structure in the Navy operational environment. This work is in support of work unit ZA601, 'Aircraft Technology', Agency Accession No. DN 681080.

Fourteen ship sets of spoilers, fabricated under previous contracted efforts, will be installed on fleet aircraft. A handbook will be prepared for squadron and field service personnel containing inspection requirements, damage criteria, and repair and maintenance procedures. Program progress will be reported quarterly for the first year and semi-annually thereafter. Spoiler ship sets will be periodically removed and shipped to NavAirDevCen for non-destructive and destructive evaluation. Program duration is five years.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

1.0036, HT PP 78-10 - INVESTIGATION OF CANDIDATE THRUST PRODUCING SYSTEMS FOR FUTURE ARMY AIRCRAFT

J. Gomez, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Applied Technology Lab., *Fort Eustis, Newport News, Virginia* 23604 (DA0E3813)

To define advanced thrust producing systems which may provide significant helicopter and fixed wing aircraft improvements in order to identify future research.

1. Review and summarize past thrustor concepts including advantages and disadvantages of each. 2. Review future Army aircraft requirements and their related mission requirements. 3. Identify thrustor systems with potential to accomplish required

missions. 4. Define scope of work required for each thrust device.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0037, HT RM 78-18 - COMBAT MAINTENANCE CONCEPTS AND REPAIR TECHNIQUES (FLUID LINES)
Unknown, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Applied Technology Lab., *Fort Eustis, Newport News, Virginia* 23604 (DA0E3827)

To design and fabricate interim- and quick-fix repair kits for leaking fuel/oil/hydraulic lines on the AH-1 helicopter.

An in-house effort will identify all fluid lines and fittings on the AH-1 and establish a fluid line size or sizes to be used to bypass any leaking fluid line. In addition, the identification of several quick-fix concepts to repair the damaged fluid line on aircraft will be accomplished. Contractual effort following will design and fabricate quick-fix kits identified by this laboratory and demonstrate the kit or kits fabricated on an operational AH-1.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0038, RESEARCH IN AERODYNAMICS
J.L. Shipley, U.S. National Aeronautics & Space Admin., Office of Aeronautics & Space Technology, Langley Research Center, *Hampton, Virginia* 23665 (DA0E3553)

To conduct basic and applied research to develop or improve analytical techniques, prediction techniques, measurement techniques, and design data related to rotary wing airfoil development, unsteady aerodynamic phenomena, rotor wake characteristics, and tip vortex generation and propagation. Investigations are selected based on continual review of the Army's aviation objectives and assessment of those fundamental technology short-comings which would prevent or restrict achievement of these objectives.

In joint participation with NASA, analytical and experimental programs will be conducted to develop rotor airfoils which are based on mission profiles and empirically derived environments. Unsteady experimental and analytical research will be conducted to develop an understanding of and the capability to analyze and predict rotor unsteady aerodynamic characteristics. Experimental programs will be conducted to quantify rotor wakes, to develop methods for drag reduction and to determine rotor performance and helicopter interference effects.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0039, PARAMETER IDENTIFICATION OF HEREDITARY SYSTEMS
E.M. Cliff, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Aerospace Engineering, *Blacksburg, Virginia* 24061 (DF139650; AFOSR-77-3221)

This work unit supports in part the AFFDL/FGC basic research plan that is intended to provide experimental methods to validate theoretical unsteady aerodynamics. The identification of these experimental aerodynamics will provide for safer control of aircraft flight. The specific objective of this work unit is to develop a parameter estimation method for a flexible aircraft described by state equations containing a convolution of the approximate Kussner/Wagner functions with the lifting surface steady aerodynamic methods. When these experimental data are better estimated and incorporated into design, the response of aircraft conventional and advanced control systems will be more rapid.

The hereditary models for a system with memory shall be generalized to include time delays on each state. The estimation procedure to identify the aerodynamic parameters of A and B, in the state such that DX/DT equals AX(T minus C) plus BU, will then be developed for C constant, C dependent upon state.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0040, AN INVESTIGATION OF SEPARATION MODELS FOR THE PREDICTIONS OF MAXIMUM LIFT COEFFICIENT 13225-EX
F.A. Dvorak, Analytical Methods Inc., *110 116th Ave. S.E., Bellevue, Washington* 98004 (DA0E9013; DAAG29 76 C 0019)

To develop a gas flow separation model which, when combined with an existing viscous/potential flow interaction analysis, results in a method capable of predicting airfoil or rotor performance at or beyond maximum lift coefficient. The proposed research will provide fundamental information for the prediction of helicopter performance and is thus highly relevant to the ARMDL mission.

Three separation models, two utilizing source distributions for representing the separated flow and the third utilizing a vorticity distribution for representing the free shear layers leaving the airfoil surface, will be evaluated for use in predicting maximum lift coefficient.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

1.0041, ADVANCED FIBER REINFORCED THERMOPLASTICS (AFRTP) FOR AIRCRAFT STRUCTURES
J.T. Hoggatt, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DF136020; F33615-76-C-3048)

Although significant advancements have been made in reducing the weight of aircraft structures through the use of advanced composites, further reductions in ownership and especially acquisition costs are potentially available through the substitution of thermoplastic matrix materials for the present thermosetting matrix materials (such as epoxies). Flat thermoplastic laminates can potentially be laid up and consolidated with highly automated processes, they can be stored without refrigeration as long as necessary (as can the thermoplastic adhesives) and they can then be postformed into complex shapes by applying heat and pressure. In addition, the thermoplastics can be welded in seconds either ultrasonically or with an electromagnetic vibration welding technique. The objectives of the program are (1) to demonstrate the potential of advanced fiber reinforced thermoplastics (AFRTP) to reduce the fabrication and assembly costs of aircraft structures, (2) to demonstrate the structural integrity and durability of an AFRTP component and (3) to simplify the repair procedures and reduce the cost of maintaining advanced composite structures.

The approach to attaining the objective is to select a structural component from either an operational system or a future production system, redesign the component, develop the manufacturing and repair techniques, manufacture the component and thoroughly test it. The selection of the demonstration article is restricted to a component that has a definite potential for acquisition cost savings and/or reduction in maintenance costs on an operational or future production aircraft. This program is sponsored jointly by the Manufacturing Technology Division of the AFML and the Structures Division of the AFFDL.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0042, DEVELOPMENT OF AN IMPROVED GROUND VIBRATION TESTING AND ANALYSIS METHOD FOR COMPLEX AEROSPACE SYSTEMS
R.F. Michalak, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DF140030; F33615-77-C-3059)

Ground vibration tests on current and new weapons systems require an excessive amount of time and cost. The general objective of this program is to develop and demonstrate an optimal, practical, and economical ground vibration test and analysis procedure for use in complex aerospace systems to determine by measurement their dynamic characteristics. The procedure developed shall be one which can be used for testing a wide variety of Air Force flight vehicles in both laboratory and field environments. The dynamic characteristics shall be of sufficient quality and in acceptable form for use in checking analytically predicted data in final flutter and other aeroelastic analyses. The specific objectives of this program are to markedly decrease the time and cost for ground vibration test (GVT), and to obtain additional dynamic characteristic data from test information.

The program will be conducted by a contractor using a team with expertise in the flutter and structural dynamics fields. To accomplish the above objective, the program will be divided into phases consisting of method selection, development, demonstration, application and reporting.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0043, TRANSONIC UNSTEADY AERODYNAMICS FOR AEROELASTIC APPLICATIONS

H.K. Yoshihara, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DF133090; F33615-78-C-3201)

This work unit supports the prediction of time-dependent loads, flutter, stability and control for flexible aircraft in transonic flight. At present, there are no analytical methods available which can be used in aircraft design, and reliance must be placed on proof-tests of extremely expensive aeroelastic wind tunnel models which yield very limited data. The objective of this effort is to improve the accuracy and realism of the design of flexible aircraft which fly in or through the transonic region. These improvements will also improve the cost and efficiency of the aircraft design process and improve flight safety.

A contractor will evaluate the aerodynamic equations for time-dependent flow over aircraft at transonic speeds. He will write computer programs to solve those equations by relaxation techniques and by time-integration techniques. The final phase will be the application of the programs to a large-scale aircraft aeroelastic design problem.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0044, MULTIVARIABLE DIGITAL CONTROL SYSTEMS

B. Porter, University of Salford, *The Crescent, Salford, England, United Kingdom* (DF138790; AFOSR-76-3005)

This work unit supports the functions of advanced aerospace vehicles. The Air Force is currently developing the use of the digital computer for flight control management. For the digital computer to solve real-time flight control equations, the computer must solve the equations in the time domain (rather than the frequency domain). The objective of the study is to analyze the real-time implementation of disturbance-rejection and tracking control policies using digital computers. The proposed effort is to develop high-performance multivariable digital control systems whose functions are simultaneously to reject external disturbances and to track multiple command inputs.

This study will analyze the practical problems involved in the real-time implementation of disturbance-rejection and tracking control policies using a digital computer. A computer simulation of the digital real-time controllers will be applied to various airborne systems in a simulation. The simulation will cover the control of airborne systems and aircraft in a number of representative flight modes. The results of the simulation studies may result in the emergence of new control performance criteria.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Matcrials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, CARBORANE BURNING RATE MODIFIERS FOR SOLID PROPELLANTS

W.E. Hill, Auburn University, School of Chemistry, Dept. of Chemistry, *Auburn, Alabama* 36830 (DN590583; N00024-75-C-5318)

To perform research on carborane compounds for use as propellant burning rate catalysts. Three main problems will be investigated: (1) possibility of migration from the propellant, (2) undesirably high melting points, and (3) low-yield synthesis.

To prevent migration, existing binders will be modified by using carboranyl plasticizers which react with double bonds of the polymers on curing. Hydroxy terminated polybutadiene (HTPB) and carboxy terminated polybutadiene (CTPB) polymers will be reacted with functional carboranes to make polymers containing boron which should not migrate easily. Silyl carboranes which contain Si-Si bonds or Si-C bonds will be synthesized. These compounds should yield high burning rates with less carborane which should be less volatile. Difunctional carboranyl isocyonates and epoxides for use as curing agents will be synthesized. Meta-isomers of carborane derivatives will be prepared and compared with their ortho analogs in an effort to lower the melting point. Carboranes will be synthesized from acetylenes for improved yield.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Sea Systems Command

3.0002, MECHANICAL BEHAVIOR OF AIRFRAME MATERIALS

N.E. Paton, Rockwell International Corp., *1049 Camios Dos Rios, Thousand Oaks, California* 91360 (DF042380; F44620-76-C-0025)

AF function - titanium and its alloys have been of considerable interest to the AF because of very favorable strength-to-weight characteristics at temperatures from cryogenic up to 800 degrees F, and resistance to attack by many chemicals. Potential applications for skins, structural and engine components of high performance aircraft, cryogenic fuel storage tanks for missiles, and tubing for transporting corrosive fuels all emphasize the available materials roles for titanium alloys. Opportunity - despite improvements in processing techniques, all commercial titanium products contain residual hydrogen which can, under certain conditions, influence their mechanical behavior. The effects of such residual hydrogen on the properties of titanium are of primary importance from a practical point of view, but these effects are incompletely understood in the more complex commercial alloys. Consequently, hydrogen is often overlooked as the cause of variability in the mechanical behavior of these alloys. Objective - this research will determine the influence of hydrogen on mechanical properties such as loss of ductility, decrease in fracture toughness, increase in creep rate, and increase in both sustained load and fatigue crack growth rates. How work contributes - the mechanisms by which internal hydrogen influences these and other mechanical properties are not well understood.

A systematic study of the effect of hydrogen content and aluminum content on the stress field around hydrides, and an investigation of tensile, creep, fatigue and sustained load cracking properties of Ti-Al and Ti-Sn specimens, with and without notches, and over a range of temperatures, will be carried out.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0003, ELECTROCHEMISTRY OF SOLUTES IN CHLOROALUMINATE SYSTEMS

R.A. Osteryoung, Colorado State University, School of Natural Sciences, Dept. of Chemistry, *Fort Collins, Colorado* 80523 (DF043300; AFOSR-76-2978)

AF function - communications and flight operations depend on auxiliary battery sources for power. Deficiency - lighter weight, higher temperature, longer life, and higher energy batteries are needed to meet the requirements. Objective - this research involves an understanding of the solution processes by which solute materials interact with certain acid solvents. These solvents are promising as battery fluids, and as systems for metallurgical separations. How work contributes - research results have the potential of improvement in high energy density batteries, corrosion prevention, new approaches for thermal batteries, and innovations for auxiliary power sources.

Electrochemical studies are to be carried out on a variety of solute species in aluminum halide based melts, mainly low temperature systems. The behavior and kinetics of oxygen, sulfur, selenium, and tellurium electrode processes will be studied. Aluminum oxychloride detection in the melt warrants a systematic investigation. Tungsten oxide, molybdenum oxide, and other oxides which appear stable and soluble in the melt, and of potential interest as cathode materials, will be examined. In attempting to identify certain chemical species in conjunction

with the electrochemical studies, there will be an increase in spectroscopic work.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0004, PHOTODETACHMENT STUDIES OF MOLECULAR NEGATIVE IONS 16023-P

W.C. Lineberger, University of Colorado, Boulder Campus, School of Arts & Sciences, Dept. of Chemistry, *1200 University Ave., Boulder, Colorado* 80302 (DA0F9198; DAAG29-78-G-0096)

To provide information required to predict the effect of light on a decaying atmospheric plasma. Negative ions play an important role in controlling the electrical conductivity in the atmosphere, and consequently the transmission of electromagnetic energy. Relevance -this research is relevant to various DOD efforts to model the atmospheric conductivity, for example, in connection with radar cross-section codes.

To utilize beam techniques to measure absolute photodetachment and photodissociation cross-sections for NO sub 2, NO sub 3, CO sub 3, and CO sub 4 anions in the spectra region 3,400-2,800 Angstroms. Fixed laser photoelectron spectrometry in the visible and near ultraviolet will also be utilized to determine binding energies and structures of atmospheric ions and cluster ions.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

3.0005, DEFECTS IN SOLID-STATE POLYMERIZED MATERIALS

J.M. Schultz, University of Delaware, School of Engineering, Dept. of Chemical Engineering, *Newark, Delaware* 19711 (DMR7821751)

This research deals with the structure of polymers synthesized in the solid state. Specifically, it deals with the defects in the crystalline structures of the solid-state polymerized materials known as poly(sulfur nitride), the halogenated derivatives therefrom, and the polymers from bis(p-toluenesulfonte) diacetylene. The methods to be used include electron and x-ray microscopy, extended x-ray absorption fine structure (EXAFS) and small-angle x-ray scattering. The principal emphasis will be on relating local imperfections with various bulk properties, such as mechanical properties.

This is a renewal of NSF grant DMR76-04789.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

3.0006, INVESTIGATIONS OF RARE-EARTH TRANSITION-METAL ALLOY HYDRIDES BY NMR AND MOSSBAUER EFFECT 13371-MS

L.H. Bennett, U.S. Dept. of Commerce, National Bureau of Standards, *Washington, District of Columbia* 20228 (DA0E9044)

To evaluate the structural factors, especially the electronic structure, which determine the mechanisms, rates, and quantities of hydrogen absorption of certain rare-earth transition-metal alloys. The research is relevant to the absorption, storage, and controlled release of hydrogen by metallic alloys. Army applications for these alloys include storage of hydrogen for fuel for power supplies (ECOM, MERDC), catalysts for hydrogen-air fuel cells (ECOM, MERDC), storage of hydrogen for low power gas guns (RIA), absorption of the hydrogen evolved from radio batteries - hydrogen which has caused explosions of field radios -(ECOM), and perhaps catalysts or absorbers of other gaseous chemical agents (EA). In addition, the research is relevant to hydrogen-enhanced stress-corrosion cracking of metals.

The program will include (1) preparation and characterization of alloys having the CaCu sub 5 hexagonal structure (where the Ca site is occupied by a rare-earth metal, and the Cu site is occupied by a transition metal), (2) determination of the crystallographic and electronic structure of the alloys before and after absorption of hydrogen, and (3) determination of the effects of electronic and crystallographic structure on the diffusion of hydrogen formation of hydrides.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

3.0007, STRUCTURE-PROPERTY-ENVIRONMENTAL RELATIONS IN GLASS AND GLASS-CERAMICS

L.L. Hench, State University System of Florida, University of Florida, School of Engineering, Dept. of Metallurgical & Materials Engineering, *220 Black Hall, Gainesville, Florida* 32611 (DF047230; AFOSR-77-3210)

AF function - advanced aircraft and tactical missile systems employ glass as a structural and optical component which requires superior mechanical, optical and thermal performance under extreme environmental conditions. Deficiency - the methodology for predicting long-term stability and performance of glass and glass-ceramics has not been established. Objective - the objective of this research is to establish predictive structure-property-environmental relations in glass and glass-ceramics. How work contributes - this research is expected to establish the relationships between environmental exposure and use and the non-destructive testing procedures for predicting long-term stability and performance in glass and glass-ceramics.

Glass chemistry will center on (1) alkali silicate, commercial, and other glasses and glass-ceramics, (2) the development of techniques to obtain quantitative analysis of the residual glassy phase, (3) the effects of the glassy phase on various physical properties and (4) environmental deterioration of the glassy phase and the effect of the deterioration on the physical properties.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0008, HOT CORROSION AND THE EFFECTS OF NACL AND CARBON

F.S. Pettit, United Technologies Corp., Pratt & Whitney Aircraft Div, *P.O. Box 2691, West Palm Beach, Florida* 33402 (DF044380; F44620-76-C-0123)

AF function - the useful lives of nickel-and-cobalt-base alloys and coatings in gas turbine engines are significantly reduced under conditions where salts are ingested into the engine or are present as fuel contaminants. Deficiency - although significant progress has been made of inhibitors in fuel and maintenance washing procedures, no general theory of the initiation stages of hot corrosion exists. Objective - this research seeks to reduce the hot corrosion problem through a thorough understanding of the initiation stage, two propogation modes, and the effects produced by NaCl and carbon deposition. How work contributes - having a knowledge of the factors which initiate the reactions will enable the rational design of turbine alloys to be made.

The scientific approach of this program involves performing oxidation tests at temperatures between 700 and 1000 degrees C on alloy specimens coated with deposits of different salts. During exposure the specimens are examined visually using hot stage microscopy. After exposure, the specimens are examined in detail using optical metallography, scanning electron and electron microscopy, x-ray diffraction and electron beam microprobe. The data obtained from experiments and analyses are then used to construct models to account for the reaction as a function of time between groups of alloys and specific salt deposit-gas environments.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0009, INITIATION MECHANISMS OF SOLID ROCKET PROPELLANT DETONATION

H. Napadensky, I I T Research Inst., *10 W. 35th St., Chicago, Illinois* 60616 (DF040790; F44620-75-C-0059)

AF function - this effort directly responds to requirements specified in research objective 5.1. Future missile systems will employ nitramine propellants. Deficiency - current attempts to develop Navy systems using these propellants have experienced unscheduled detonations. Objective - this contract seeks to iden-

tify the causes and mechanisms of deflagration to detonation transition. How work contributes - permits the use of high energy propellants for optimized propulsion performance without creating unreliable systems.

Theoretical and experimental studies of impact phenomena are being conducted. The propellants experimentally studied are chiefly nitramine formulations. The impact studies are made with carefully controlled flyer plate velocities. High speed motion pictures and scanning electron microscopy are the chief diagnostic tools. The studies focus cheifly on crack propagation, crack enlargement or collapse, and other effects of high-pressure, high-temperature gas flow. Theoretical work aims at refining the present IITRI DDT model to include the simultaneous variation of pressure and area within cracks, the effects of stress waves on multiple cracks, and the interaction of foam and melt layers with stress waves.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0010, CORROSION FATIGUE BEHAVIOR OF ALUMINUM ALLOYS

J.H. Mulhern, Materials Research Lab. Inc., *1 Service Rd., Glenwood, Illinois* 60425 (DA0B0677)

This proposed contract effort will be the result of an unsolicited proposal which has been received from Materials Research Laboratory, Inc. The objective of the work is to investigate the corrosion fatigue behavior of both 7000 series powder metallurgy and ingot metallurgy aluminum alloys in both inert and aggressive environments. The fatigue behavior will be determined by measurements of the fatigue crack growth rate at high delta K values. Such work is of extreme importance to helicopter structural parts, bridging and tank automotive structures.

The fatigue crack growth rate will be measured at various high delta K values from 7075-T6 and a new aluminum powder metallurgy alloy MA87. The variables to be examined are the environment, frequency, wave form, and stress intensity ratios. The influence of these variables will be described in terms of fracture mechanics paramaters.

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Fire Control & Small Caliber Weapon Systems Lab.

3.0011, RELATION OF STRUCTURE TO FATIGUE PROPERTIES IN ALUMINUM-BASE ALLOYS

M.E. Fine, Northwestern University, Evanston Campus, Technological Inst., Dept. of Materials Science, *633 Clark St., Evanston, Illinois* 60201 (DF041810; AFOSR-76-2892)

AF function - the longevity, reliability and safety of aerospace structures are related to the fatigue properties of the structural materials used. In fact, the fatigue properties of structural materials often limit their application. Opportunity - it is important to understand the mechanism of fatigue and especially the metallurgical means by which fatigue resistance may be improved. Objective - this research will relate fatigue crack initiation, fatigue crack propagation, and the character of the plastic deformation from cyclic loading to the structure of aluminum base alloys, particularly those which contain copper as the major precipitation hardening alloying element. How work contributes - such information will point the way to development of improved fatigue resistant aluminum base alloys. Since aluminum alloys form a major portion of the material currently used for skin and other structural airframe applications, it is appropriate that they are the basis of this investigation.

The effects of several different kinds of precipitates and other dispersed phases will be investigated. In addition, this research will determine a method of simultaneously increasing both the cyclic yield stress and the effective surface energy for fatigue crack propagation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0012, CORROSION OF FIBER COMPOSITES WITH ALUMINUM ALLOY MATRIXES 14350-MS

M. Metzger, University of Illinois, Urbana Champaign Campus, School of Engineering, Dept. of Mining & Metallurgical Engineering, *207 Engineering Hall, Urbana, Illinois* 61801 (DA0E9290; DAAG29 77 G0025)

To investigate the principles governing the corrosion behavior of fiber composite materials with aluminum alloy matrixes when exposed to aqueous and atmospheric environments. Relevance - the Army evaluators cite relevance of this investigation to potential utilization of fiber reinforced aluminum matrix composites in aircraft, missiles, equipment such as bridges, and in design concepts for general application of composite materials.

Research will include: (1) the galvanic effects of coupling graphite and alumina fibers to aluminum matrix will be studied to determine the electrochemical reactions and their kinetics as a function of sample geometry and environmental chemistry; (2) effects of interface layers and identification of relation between selective attack at the interface and the interface phases present, and effects of interfacial layer thickness on corrosion behavior; and (3) study of crevicing and other localized attack which may be caused by incomplete fiber-matrix interfacial bonding.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

3.0013, CALCULATION OF CERAMIC PHASE DIAGRAMS

L. Kaufman, Manlabs Inc., *21 Erie St., Cambridge, Massachusetts* 02138 (DF042880; F44620-76-C-0060)

AF function - ceramic materials are being developed for a variety of components (e.g. blades, vanes, rotors, combustors, bearings and seals) in future gas turbine engines and for a variety of electronic and optical components in aircraft. Opportunity - the process of selecting the chemical composition and heat treatment of any material to obtain optimum properties has been a slow one based upon past experience and time consuming experimentation. Over the past ten years computer techniques have been developed for calculating the phase diagrams of simple binary and selected ternary metal alloy systems. This offers the possibility of rapidly and economically searching out phase equilibria on any combination of metals desired. Objective - the calculational techniques developed for metal alloys will be extended into ceramic systems based on combinations of Cr, Al, Fe, Mg, Ca, Si, nitrogen, and oxygen. How work contributes - this work contributes to the selection of thermodynamically stable materials for future AF turbine engines.

The lattice stability, compound and solution phase interaction parameters will be evaluated to characterize the stable and metastable phases. Thermochemical data will be estimated from existing experimental phase diagrams where necessary.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0014, DEVITRIFICATION PROCESSES IN AMORPHOUS METALS

D.R. Chipman, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center, *Watertown, Massachusetts* 02172 (DA0F4739)

Work now in progress will compare the properties of metal-metalloid and metal-metal systems in amorphous form. From those materials studied, one or more having promise for Army applications will be chosen for additional investigation of the amorphous structure. The objective of the work will be to define and determine parameters of this structure most useful in relating to applications; for example, parameters connected with crystallization. An allied mechanical testing program will allow correlation of observed structural changes with property changes.

Amorphous alloy specimens will be prepared and given a preliminary test evaluation by Professor B. C. Giessen and Dr. D. E. Polk, Northeastern University, under contract with this program. Alloy structures will be characterized through x-ray diffraction measurements. These will be correlated with the crystallization temperature, resistivity, hardness and/or susceptibility, and mechanical behavior in tension, creep and fatigue.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center

3.0015, MORPHOLOGY AND KINETICS OF STRAIN-INDUCED CRYSTALLIZATION OF POLYMERS DURING FLOW 15299-MS

G.S. Yeh, University of Michigan, Ann Arbor Campus, School of Engineering, Dept. of Metallurgical & Materials Engineering, *Ann Arbor, Michigan* 48104 (DA0G8956; DAAG29-79-G-0029)

To extend work on stress-induced crystallization (SIC) of elongational non-flow polymer systems to shear flow systems in order to formulate a SIC theory comparable to one currently available for quiescent crystallization. Such a study would provide guidelines for polymer processing or fabrication which involves SIC (e.g., fiber spinning, film extrusion). Relevance - the research may find Army applications in a variety of end items, from personnel armor to helicopter components to encapsulation of chemical components and smoke ingredients.

Based upon earlier findings relating SIC crystal thicknesses and crystallization kinetics to crystallization temperature, strain, and/or strain rate, morphological and kinetic studies would be carried out. Polyethylene would be crystallized by shear in a dilatometer, including variables such as molecular weight variations. In addition, other polymers, such as polypropylene and polybutene, with increasing branch chain lengths, would be studied.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

3.0016, MACRO/MICRO STUDIES OF HYDROGEN EMBRITTLEMENT MECHANISMS IN TITANIUM AND ALUMINUM ALLOYS

W.W. Gerberich, University of Minnesota, Minneapolis Campus, School of Engineering, Dept. of Chemical Engineering & Materials Science, *105 Morrill Hall, Minneapolis, Minnesota* 55455 (DF046300; AFOSR-77-3133)

AF function - hydrogen embrittlement is a serious problem that causes mechanical property degradation in our most significant aircraft materials including steels, titanium, aluminum and nickel-base alloys. The various forms of hydrogen-related mechanical property degradation severely restrict the serviceability of important aircraft materials. Opportunity - basic understanding of the manner by which hydrogen acts to reduce mechanical strength and cause failures is important if we are to minimize and control these forms of attack. Objective - this research will investigate the hydrogen embrittlement susceptibility of titanium and aluminum alloys from both macroscopic and microscopic points of view. Macroscopic studies will focus on a fracture mechanics evaluation of the effects of gaseous and internal hydrogen on threshold stress intensities and crack growth conditions; microscopic studies will focus on the mechanistic details of nucleation and growth processes in concentration gradients. How work contributes - this not only has ramifications to alloy design, but carries specific ramifications to component design where sustained load, spectrum fatigue loading or corrosion fatigue might be encountered.

Factors to be investigated include specimen thickness, internal versus external hydrogen, temperature effects, phase stability, hydride formation, decohesion at particle-matrix interfaces, and in situ concentration profiles.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0017, PREPARATION AND STUDY OF HIGHLY REACTIVE METAL POWDERS 15255-C

R.D. Rieke, University of Nebraska, Lincoln Campus, School of Arts & Sciences, Dept. of Chemistry, *Lincoln, Nebraska* 68508 (DA0F9102; DAAG29-78-G-0007)

To determine the scope and limitations of a new technique for generating metal powders in a finely divided and highly reactive state; to establish the modes of reactivity. Relevance - reactive metals are used in rocket propellants, in explosive and pyrotechnic formulations. Certain basic synthetic procedures have been accomplished in a direct fashion only since the discovery of the subject process.

Main group and transition metal salts will be reduced with molten potassium metal in inert solvents; the effect of crown ethers will be explored.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

3.0018, DISLOCATION DENSITY IN FATIGUED SPECIMENS

S. Weissmann, Rutgers the State University of New Jersey, New Brunswick Campus, School of Engineering, Dept. of Materials Engineering, *Old Queens Bldg., New Brunswick, New Jersey* 08903 (DN678757; N00167-75-M-8315)

To measure the dislocation density in fatigued specimens by x-ray techniques.

A double crystal diffractometer will be used to determine the widths of the diffraction lines. This line width is related to the excess dislocation density and particle size. The line widths will be determined as a function of distance from the surface and the fraction of fatigue life. X-ray topographs will be used to measure the dislocation density.

SUPPORTED BY U.S. Dept. of Defense, Naval Ship Research & Development Center, Ship Materials Engineering Dept.

3.0019, COORDINATION OF FUELS AND LUBRICANTS RESEARCH

R.K. Nelson, Coordinating Research Council Inc., *30 Rockefeller Plaza, New York, New York* 10020 (DA0N3747; DAAK70 78 C 0102)

Coordinate test programs and research and development among the petroleum industry, automotive industry and the US Government. The areas of interest include fuels and lubricants, lubricants and related material and equipment testing, and service evaluation testing of fuels, lubricants and power transmission fluids for both surface and air applications.

Establish advisory groups and panels in those areas where a broad range of knowledge and experience will be helpful and impossible to maintain as an in-house capability. These are formed by drawing engineers and scientists from the automotive and petroleum industries who cooperate with the CRC. The latter administers and coordinates the programs. Work is divided into four major categories: (1) special, (2) aviation, (3) diesel vehicle, (4) motor (gasoline) vehicle.

SUPPORTED BY U.S. Dept. of Defense, Mobility Equipment Research & Development Command, Fuels & Lubricants Div.

3.0020, MATERIALS SUPPORT TECHNOLOGY CHEMICALLY PRODUCED EXCITED STATES

J. Wiesenfeld, Cornell University, Ithaca Campus, School of Arts & Sciences, Dept. of Chemistry, *Ithaca, New York* 14850 (DN323075; N00014-75-C-0828)

The technical objective of this contract is to understand the chemical and physical processes which control the behavior of electronically excited atoms and molecules in the gas phase. The Navy needs more detailed knowledge of chemical reaction kinetics. Particular items here are new techniques for chemical synthesis, rocket propellants with modified plume radiation characteristics, and new materials for chemical lasers.

Additional quenching processes in the quenching of excited I by Br(2) relative to those already studied are being investigated. Then the quenching of excited I by HBr will be studied to compre the two processes. The lifetime of the doublet P (J equals 1/2) state of I is being measured using time-resolved atomic absorption spectroscopy.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0021, NAVY VEHICLE DESIGN AND CONSTRUCTION - DISPERSION STRENGTHENED METAL ALLOYS

G.S. Ansell, Rensselaer Polytechnic Inst., School of Engineering, Dept. of Metallurgical Engineering, *110 8th St., Troy, New York* 12181 (DN525008; N00014-76-C-0458)

The Navy has a need for high strength, high toughness metal alloys for use in a wide variety of components ranging from pumps and compressors to aircraft frame structure and jet engine parts. Improved alloys would result in greater reliability, better performance and/or decreased weight. In this research the investigator will explore mechanisms of strengthening in metal alloys, with emphasis on martensitic steels and nickel alloys for use at high temperatures.

Strengthening of martensitic steels will be examined with regard to factors controlling martensite morphology. Variables include imposed stress, crystal orientation and composition. The degree of relaxation of the austenite shear modulus will be determined and the observations related to martensite formation. Nickel superalloys that are strengthened by gamma prime precipitates will be carefully examined to see how precipitate coherency strains affect the mechanical behavior, particularly the creep, stress rupture, and tensile properties at high temperatures.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0022, INFLUENCE OF ANNEALING ON THE STRENGTHS OF SECONDARY RELAXATIONS IN GLASSES

M. Goldstein, Yeshiva University, New York Campus, School of Science, Dept. of Chemistry, *601 W. 183rd St., New York, New York* 10033 (DF037090; AFOSR-73-2540)

AF function - advanced aircraft systems will require new lightweight structural components with improved environmental stability and reliability. Deficiency - the process control of new thermally stable polymeric systems for matrix resins and adhesives is not well understood. Objective - the quantitative relationships between glass structure, relaxation processes, and annealing treatments in the transition range of noncrystalline solids will be determined. How work contributes - it is expected that this research will lead to a better understanding of the glass transition phenomena and generate information for the control of the glass transition temperature and, thereby, polymer processing and the resultant engineering properties.

The dependence of relaxation strength on structural state or fictile temperature in glasses including molecular and hydrogen bonded liquids, fused salts and organic high polymers will be investigated. The beta-relaxation and low temperature relaxations will be studied by dielectric and calorimetric measurements. The thermodynamic implications of various structural hypotheses will be explored to determine which glass structural theory is supported by the experimental data.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0023, MECHANISMS OF PHOTOCHEMICAL DEGRADATION IN XANTHENE LASER DYES

R.E. Schwerzel, Battelle Memorial Inst., Columbus Laboratories, *505 King Ave., Columbus, Ohio* 43201 (DF047980; AFOSR-77-3313)

AF function - future Air Force flight operations in reconnaissance, communications, and other areas require new systems including lasers of varied wavelengths. Deficiency - research is needed to define methods to minimize dye photochemical instabilities while maintaining the overall high efficiency derived from flashlamp pumped laser systems. Objective -to study and identify photodegradation products of xanthene dyes and recommend approaches for future development of improved laser dye systems having enhanced photochemical stability. How work contributes -the work should provide more efficient organic laser dye systems.

The research will emphasize the separation and identification of the primary photochemical degradation products from solutions of kiton red S in methanol and water, both in the presence and absence of oxygen. This effort will rely heavily on the use of high pressure liquid chromatograph, gas chromatography/mass spectrometry, infrared, visible, and ultraviolet spectroscopy, and nuclear magnetic resonance spectrometry. In parallel with these studies, the lasing characteristics of kiton red S will be evaluated in a tunable, flashlamp pumped, pulsed dye laser, in the presence and absence of oxygen, argon, and previously isolated degradation products. In this way, the effects of dye degradation on the efficiency and wavelengths of lasing can be compared with the spectroscopic changes which have been observed in course of the non-laser irradiations performed to date. Finally, the quantum yields of photodegradation and of product formation will be evaluated at several different irradiation wavelengths, both in the presence and absence of oxygen.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0024, WEAPONRY - THE ROLE OF CHEMICAL BONDING IN THE STRENGTH OF ADHESION IN POLYMERS

A.N. Gent, University of Akron, Inst. of Polymer Science, *302 E. Buchtel Ave., Akron, Ohio* 44304 (DN675225; N00014-76-C-0408)

The objective is to determine how the adhesive strength of polymeric materials is related to the type and density of interfacial bonds, the rate of detachment and temperature. This fundamental knowledge is necessary to guide missile propellant developers to select the optimum bonding agents. The data will also be useful as inputs into fracture mechanics analyses of propellant grain response to stress. Propellant fracture must be avoided to insure stable burning and to preclude the deflagration to detonation transition.

Functionalized and characterized synthetic polymer substrates will be interfacially reacted to produce an adhesive interface. Surface bond density will be altered and the strength of adhesion will be determined as a function of temperature and the rate of detachment. Adhesives similar to those in propellant manufacture will also be characterized.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0025, FATIGUE IN POWDER METALLURGY ALUMINUM ALLOYS

A. Lawley, Drexel University, School of Engineering, Dept. of Metallurgical Engineering, *32nd & Chestnut Sts., Philadelphia, Pennsylvania* 19104 (DF047690; AFOSR-77-3247)

AF function - the longevity, reliability and safety of aerospace structures are related to the fatigue properties of the structural materials used. Opportunity - since the fatigue properties of structural materials often limit their application, it is important to understand the mechanism of fatigue and especially the metallurgical means by which fatigue resistance may be improved. Objective - this research will establish and quantify processing-microstructure-mechanical behavior relationships in fully-dense powder metallurgy materials. Particular interest centers on fatigue response in aluminum-base alloys and includes the roles of stress state and environment. How work contributes - since aluminum alloys form a major portion of the material currently used for skin and other structural airframe applications, it is appropriate that they are the basis of this investigation.

The fundamental understanding of the fatigue behavior of powder-metallurgy-processed aluminum alloys to be developed during the course of this research will provide the basis for carrying out future alloy and process development to achieve improved materials. In addition, the principles developed during the course of this investigation should also be applicable to other age-hardening systems.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0026, FATIGUE CRACK PROPAGATION IN POLYMERIC MATERIALS 14409-MS

R.W. Hertzberg, Lehigh University, School of Engineering & Physical Science, Dept. of Metallurgical & Materials Science, *Alumni Memorial Bldg., Bethlehem, Pennsylvania* 18015 (DA0E9233; DAAG29 76 G0336)

To study (a) the relative fatigue crack propagation (FCP) frequency sensitivity of polymers over a range of temperature; (b) the effect of molecular weight and molecular weight distribution on FCP behavior in polymers; (c) the kinetics and micromechanisms of cyclically-induced craze and crack growth in polymeric solids. Relevance - the research is relevant to a

number of Army problems in flight vehicles (e.g., in windshields, airframe structures, etc.) and to a wide range of structural and nonstructural Army applications where plastics and polymer-based composites are coming into usage as substitutes for metals and alloys because of lighter weight, cost savings, and other factors.

FCP frequency sensitivity will be studied with the aid of transition measurements (related to segmental molecular motions). Frequency sensitivity and propensity for discontinuous crack extension will be examined as a function of molecular weight and molecular weight distribution. Electron fractography would be employed in studies of crack morphology and to assist in identification of the micromechanisms underlying crack growth.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

3.0027, DEUTERATION OF FLUIDS FOR NAVAL AIRCRAFT

N. Rebuck, U.S. Dept. of Defense, Navy, Naval Air Development Center, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974 (DN933001)

The goal of this program is to provide scientific guidelines for the next generation of aircraft fluids based on deuterium modified molecules. A more complete definition of deuteration processing will define directional information for new approaches to wide temperature range fluids combined with extreme pressure lubricant effects.

Our approach in this investigation involves the exchange of hydrogen atoms in a synthetic fluid with deuterium atoms via a liquid/gas phase transfer mechanism in the presence of a suitable catalyst. The properties of the resultant deuterium modified fluid are investigated in the fluid state as well as compounded into a grease formulation.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

3.0028, RESEARCH ON CATASTROPHIC DAMAGE PHENOMENA AND DAMAGE CONTROLLING NAVAL AIRCRAFT ALLOYS

J.J. Deluccia, U.S. Dept. of Defense, Navy, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate, *Warminster, Pennsylvania* 18974 (DN781418)

To develop advanced materials science concepts for fracture and corrosion control. To study environmental embrittlement phenomena of high strength steel, titanium and aluminum alloys using an integrated mechanistic approach. Determine the effect of hydrogen on the embrittlement of, and the means for mitigation of, high strength alloys vital to the use of such material in high performance aircraft.

Damage control will be approached from two standpoints: prevention of embrittlement through process control and arrestment of corrosion and crack propagation through the development of new compounds that could be applied in situ. The idea of minimizing electrochemical hydrogen entry into metals by imposing physical constraints such as electromagnetic fields will be investigated. Based on the chemistry of the laboratory successful corrosion preventive compounds, crack arrestment compounds capable of displacing moisture from the crack tip and providing inhibition will be developed. The diffusion of embrittling hydrogen in high strength aircraft alloys will be studied using the electrochemical permeation and metallurgical techniques in various chemical and mechanical environments.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

3.0029, ELECTRONIC STRUCTURE AND STABILITY OF METALLIC GLASSES 13723-P

J. Tauc, Brown University, Graduate School, Dept. of Physics, *University Hall, Box 1883, Providence, Rhode Island* 02912 (DA0E9132; DAAG29 76 G0221)

Develop theoretical and experimental understanding of the influence of the electron gas on the stability of metallic glasses. Relevance -metallic glasses prepared by fast quenching of some alloys have many valuable properties of technological importance. Among these outstanding characteristics are high strength, ductility, corrosion resistance and simplicity of production. Increased understanding of the mechanisms which control the stability of these and other systems is crucial to the ultimate exploitation of their potential.

A test of the basic assumptions of an electron theory of metallic glasses will be made by a variety of experiments including ultraviolet photoemission, optical properties, magnetic susceptibility, transport properties and inelastic neutron scattering. An attempt will be made to extend the present theory to other classes of alloy systems.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

3.0030, SPACE ENVIRONMENTAL EFFECTS ON ADVANCED COMPOSITES

R.C. Tennyson, University of Toronto, *92 College St., Toronto, Ontario, Canada* M5S 1B2 (DF053280; AFOSR-78-3694)

AF function - large space structures will be of major significance to the Air Force with the operational capability of the space transportation system (STS). Opportunity - the influence of the space environment on the mechanical and thermal properties of advanced composite structural materials is largely unknown. This research will provide a unique opportunity to investigate these conditions. Objective - to identify the influence of simulated and in-situ space environmental conditions on the mechanical characteristics of advanced composite materials in real-time and to evaluate accelerated environmental exposure techniques. How work contributes - results will contribute to the development of large space structures for the Air Force.

Tubular test specimens fabricated from graphite-epoxy prepreg tapes will be used in the experimental research. Both layup angles for symmetric laminates and ply thickness will be varied during the experiments to be conducted. Experiments will be conducted at both ambient and simulated space conditions. Space simulated conditions will be at 10 exp 7 torr and from minus 200F to plus 250F. Thermal coefficients of expansion (CTE), internal stresses and outgassing products will be measured under steady state exposure and thermal cycling. In addition, stress-strain behavior, strength and fracture toughness will be determined as a function of exposure conditions. Accelerated environmental exposure techniques will also be investigated. Finally, comparisions will be made between the experimental results obtained as a result of ground space simulation and results from specimens used on NASA Long Duration Exposure Facility (LDEF).

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, COMPUTER-BASED LANDING SIGNAL OFFICER CARRIER AIRCRAFT RECOVERY MODEL

G. Borden, Human Performance Research Inc., *616 Carlo Dr., Goleta, California* 93017 (DN894013; N61339-77-C-0110)

In support of development of a trainer for landing signal officers (LSO), a study is required to expand a laboratory-developed preliminary model of ideal LSO 'waving' behavior to include precautionary and advisory calls. The model will be used to judge performance of student LSOs during training.

Initial model bases power and waveoff calls (EMCON model) on three approach parameters. Expanding number of monitored parameters and degree of approach segmentation will allow all NATOPS calls to be generated.

SUPPORTED BY U.S. Dept. of Defense, Naval Training Equipment Center, Human Factors Lab.

4.0002, LED (LIGHT EMITTING DIODE) WATER ACTIVATED SWITCH
W.D. Raftery, Koch & Sons, *Anaheim, California* 92807 (DN881342; N62269-77-C-0367)

To develop a failsafe water activated parachute canopy release device for use in Navy aircraft. This contract supports work unit ZB104, Agency Accession No. DN681085.

Twelve prototype LED (light emitting diode) water activating switches will be designed and manufactured. These switches automatically release the parachute/harness fittings by use of an electrically explosive piston actuator. After delivery of the prototypes, an in-house test and evaluation program will be conducted.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

4.0003, COMMUNICATIONS - CHARGED PARTICLE ACCELERATION IN THE INNER MAGNETOSPHERE
W.P. Olson, McDonnell Douglas Astronautics Co., *5301 Bolsa Ave., Huntington Beach, California* 92647 (DN875382; N00014-78-C-0215)

The precipitation of energetic magnetosphereic particles during geomagnetic disturbances degrades or disrupts the performance of naval communications, navigation, and surveillance systems with operating frequencies ranging from the ELF to the SHF bands. Those precipitating particles, originally of solar wind origin, are accelerated by more than an order of magnitude within the magnetosphere. The purpose of this study is to investigate the processes responsible for this acceleration, and which are not currently understood. An understanding of these processes is required to successfully develop a dynamical physical model to predict the occurrence and effects of geomagnetic disturbances.

The sophisticated model of the geomagnetic field developed previously by this group will be used to quantitatively determine the acceleration and energization of charged particles caused by the time varying magnetic field (caused by the diurnal rotation of the dipole axis) and its associated electric field. The electric field induced by the time varying magnetic field will also be used to study the mapping of electric fields from the ionosphere into the magnetosphere.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0004, ADVANCED SURFACE SINGULARITY TECHNIQUES FOR CALCULATING 3-D POTENTIAL FLOW
J. Hess, McDonnell Douglas Corp., *3855 Lakewood Blvd., Long Beach, California* 90808 (DN881120; N62269-76-O-0377)

To develop advanced singularity techniques for calculating three-dimensional potential flow about arbitrary bodies, and to prepare and deliver a computer program for the calculation. The contract supports work unit NN701, Agency Accession No. DN481077.

Under a previous contract, a computer program was developed at Douglas using panel method. This program requires a large computing cost for complex body configurations. In the proposed work, curved surface panels and a variable surface singularity strength will be used in place of flat panels and constant singularity strength used in the previous program.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

4.0005, WORLDWIDE PERFORMANCE OF TACTICAL MILLIMETER WAVE RADIO LINKS
N. Feldman, Rand Corp., *1700 Main St., Santa Monica, California* 90406 (DA0F2854; DAAB07-77-C-0142)

The objective of this study program is to investigate the environmental performance of tactical millimeter wave transceivers operating in frequency bands from 35 GHz through 75 GHz, with voice, TV and data communications.

Using available worldwide rainfall data, calculations will be performed on radio fading, link performance, maximum range, outage/availability. Automated techniques for increasing link availability will be investigated by analyzing various operating parameters - power transmission, space, time/frequency diversity techniques, or a combination thereof. An investigation will be made of whether an enemy can use satellite meteorological data, airborne/ground weather radar data/sensor information, to determine if Army millimeter wave radio outages exist in order to gain tactical advantage.

SUPPORTED BY U.S. Dept. of Defense, Communications Research & Development Command, Center for Communications Systems

4.0006, MECHANICAL RESPONSE OF STRUCTURAL ELEMENTS TO DYNAMIC LOADS
G. Herrmann, Stanford University, School of Engineering, Dept. of Applied Mechanics, *Stanford, California* 94305 (DF050670; AFOSR-77-3403)

AF function - Air Force aerospace vehicles encounter time dependent external loads during flight. Opportunity - new structural designs emerging as applications of advance composite materials and bonding techniques provide a new dimension to the study of structural dynamics. Objective - the objective of this research is to study the behavior of new structural concepts and develop theories which can be applied to accurately predict their dynamic response. How work contributes - this research contributes to the science base of structural technology.

This research will consider a number of physical models to study dynamic behavior in differing time regimes. Wave propagation behavior will investigate the propagation of different wave types in laminated composites and bonded structures. Amplitude, phase and dispersion characteristics will be the major quantities of interest in this study. Response of composite structures to moving loads representative of pressure waves will be investigated. Finally, steady-state and transient response studies will be conducted. In summary, the principal effort will be in extending approximate theories of the effective dispersion theory previously developed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0007, INVESTIGATION AND DEVELOPMENT OF AEROSPACE RECOVERY SYSTEM MATERIALS
D. Reinhold, U.S. Dept. of Defense, Navy, National Parachute Test Range, *El Centro, California* 92243 (DN895412)

To obtain necessary information and develop safe and economical techniques for establishing: (a) service life of materials, components, and systems; (b) maintenance procedures for systems and components; (c) storage and packing techniques and environments for materials and components. Goals are to increase service and storage life, minimize maintenance, reduce bulk of packed parachute, and maintain or increase present reliability and performance standards.

Conduct test and evaluation to form a basis in theory, equations, and empirical data relating to material creep; cyclic fatigue; environmental effects of pressure packing, inert atmosphere storage, and packing methods, and destructive and nondestructive testing. These data will be used to establish service life, maintenance procedures, and storage/packing procedures, age life, and service life.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0008, FUNDAMENTAL COMBUSTION STUDIES RELATED TO AIR BREATHING PROPULSION
F.A. Williams, University of California, San Diego Campus, School of Engineering, Dept. of Aerospace & Mechanical Engineering Science, *P.O. Box 109, La Jolla, California* 92037 (DF034870; AFOSR-77-3362)

AF function - advanced air breathing engines, airborne weapons delivery and defense. Deficiency - insufficient understanding of the basic mechanisms and processes involved in advanced air breathing combustors and lack of realistic guidelines for predicting propulsion engine and external burning characteristics and combustor design with acceptable pollutant emissions. Objective - to understand and develop accurate theoretical and mathematical models describing the hydrocarbon droplet com-

bustion and extinction, carbonaceous particle ignition and combustion phenomena in premixed and unpremixed turbulent subsonic and supersonic reactive flows. How work contributes - will provide additional understanding and realistic analytical modeling of turbulent reactive flow fields not now available and will contribute to establishing realistic design criteria for efficient, stable air breathing combustors with increased combustion efficiency and acceptable exhaust gas pollutants and reduced vehicle detectability. Also will aid design of external burning and other types of propulsion and control systems utilizing turbulent diffusion flames.

Ignition and combustion mechanisms of hydrocarbon droplets and carbon particles, and turbulent diffusion-flame combustion will be studied. High speed photography will be used to observe individual droplet and carbonaceous particle ignition and combustion in controlled oxygen-containing atmospheres. Pressures will range from 1/10 to 5 atm. and droplet and particle diameters from 20 to 2000 microns. Ignition will be produced by a pulsed laser and by a spark discharge. Attention will be focussed on hydrocarbon materials including alternate fuels (e.g. alkanes, branched paraffins, alcohols and shale oil derived fuels and carbonaceous materials). The theoretical methods will be primarily analytical, but involving small-scale computer calculations. Experimental observations will guide development of burning process theoretical models. For the hydrocarbon droplets and carbon particles, emphasis will be on combustion dynamic aspects of steady-state combustion processes, of overall finite-rate gas-phase chemistry and of extinction processes, as they affect smoke production and loss of combustion efficiency. For turbulent diffusion flames, the emphasis will be on perturbation methods and on novel ways to calculate burning rates, nitric oxide production rates and flame speeds.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0009, TRANSONIC WING THEORY

H.K. Cheng, University of Southern California, School of Engineering, Dept. of Aerospace Engineering, *3551 University Ave., Los Angeles, California* 90007 (DN123361; N00014-75-C-0520)

The development of accurate procedures for the calculation of three-dimensional flows is essential for the design and optimization of naval aircraft. This research will develop a systematic expansion method for studying the effects of lift and thickness on the inviscid transonic flow over wings and wing body combinations for wing geometries (aspect ratios) of current interest.

The transonic flow regime is one of the most difficult fields of aeronautical research because of the intrinsic non-linearity of the problem; yet it remains one of the most important from a military viewpoint. Though most of the present theoretical transonic research is directed to two-dimensional flows, real flows are three-dimensional. In the proposed research, the small disturbance inviscid equation of motion will be studied. Specifically, two different flow regimes will be examined: thickness dominated (lift may be present) and lift dominated. A lifting line theory for transonic flows will be developed. Attention will be devoted to far field shock waves to extend the validity of the analysis to the low supersonic portion of the transonic regime.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0010, ANTENNA MEASUREMENTS & CONSULTATION

A.C. Newell, U.S. Dept. of Commerce, National Bureau of Standards, *325 S. Broadway, Boulder, Colorado* 80302 (2765408)

PROJECT OBJECTIVES: Provide essential and appropriate antenna measurement support to other government agencies and industry in order to relate critical antenna parameters such as gain, polarization, pattern, and noise to primary physical standards.

PROJECT APPROACH: Develop special measurement techniques for new and unique systems or situations; perform specialized measurements requiring accuracies and/or capabilities available only at NBS; consult with other organizations on specific measurement problems and on the improvement of their overall measurement capabilities; and transfer newly developed technology outside NBS through cooperative measurement programs, courses, MAP's guest workers, etc.

PRIOR YEAR ACCOMPLISHMENTS: Developed computer programs which greatly increased usefulness of portable near-field measurement systems. Demonstrated feasibility of using near-field techniques for evaluating shaped-beam satellite antennas.

SUPPORTED BY U.S. Dept. of Commerce, National Bureau of Standards

4.0011, NON-LINEAR FAILURE CRITERIA AND DYNAMIC SPHERICAL SHELL RESPONSE

H. Liebowitz, George Washington University, School of Engineering & Applied Sciences, Dept. of Civil Mechanical & Environmental Engineering, *725 23rd St. N.W., Washington, District of Columbia* 20037 (DN475447; N00014-75-C-0946)

For various operating naval structural systems such as aircraft, submarines, surface ships, etc. the problem of premature fracture under normal service loads or excessive damage due to shock type loads should obviously be prevented. Fracture of materials of naval interest as well as shock response of selected submarine components are addressed under this task.

Research is continuing along the following lines: experimentally evaluating non-linear energy fracture toughness as a function of specimen thickness for several aluminum and titanium alloys; extending a finite element analysis approach to incorporate non-linear material response into the numerical calculation of the toughness parameter; determining the dynamic response of shallow spherical shells under various pressure pulse loadings.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0012, BOUNDARY LAYER CONTROL

P.S. Klebanoff, U.S. Dept. of Commerce, National Bureau of Standards, *Washington, District of Columbia* 20228 (2130484)

PROJECT OBJECTIVE: To improve the performance of compressible flow wind tunnels as laboratory instruments for obtaining reliable test and design data.

PROJECT APPROACH: Two aspects of the problem are being investigated. One is to determine the feasibility of laminarizing boundary layers in the test sections of compressible flow tunnels by using suction. This aspect utilizes the NBS Mach 2,3-inch by 4-inch tunnel. The other is the effectiveness of boundary layer trips at transonic speeds. Involved herein is a study of modifications of the Mach 2 tunnel in order to operate in the transonic regime, and a fundamental study, at incompressible flow speeds, of the behavior of three-dimensional roughness elements in inducing transition which will be conducted in the NBS unsteady wind tunnel.

PRIOR YEAR ACCOMPLISHMENTS: Designed rodded-nozzle block for laminarization investigation. Designed flat plate for boundary layer (trip) investigation. Designed traversers for boundary layer (trip) investigation.

SUPPORTED BY U.S. Dept. of Commerce, National Bureau of Standards

4.0013, MICROWAVE INTERACTIONS WITH SEMICONDUCTOR DEVICES

T.G. Giallorenzi, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN880030)

To investigate the interaction of light with solid state microwave devices so that optical control may be implemented; to study the dynamics of carrier transport in III-V semiconductors and to study carrier relaxation, trapping, mobility in amorphous semiconductors. Through light control of solid state devices, it is expected that new solid state device capabilities will result and improved performance from existing devices realized. The Navy has a continuing need for semiconductor devices with improved performance and a hybrid optical/microwave technology may satisfy these continuing needs.

Using semiconductor lasers and fiber optics, light will be directed onto semiconductor devices to investigate gating, frequency shifting, domain initiation and phase locking. Basic phys-

ical interactions will be investigated using picosecond laser sources, optically synchronized electrical switches and semiconductor test samples. Carrier mobility, relaxation, trapping and high field band bending effects will be investigated. Subpicosecond transient effects will be investigated in subsequent studies using mode-locked dye lasers.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

4.0014, RADIO SOURCES

C.H. Mayer, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN880100)

Conduct research leading to application of natural radio sources and related technology for improvement in areas of navigation and guidance, signal detection, remote sensing and surveillance.

Detect and map extragalactic, galactic, and solar system radio sources with current emphasis on identification of radio sources with optical and infrared counterparts, such as stars. Determine size, structure and positional relationships by interferometer techniques for relating radio and optical/IR components and position reference systems. Investigate emission mechanisms particularly in relation to radio/optical IR positional coincidence, and the physical relationships of radio sources in prestellar and stellar evolution.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

4.0015, RESEARCH ON SIMULATOR TRAINING EFFECTIVENESS

P.W. Caro, Seville Research Corp., *Pensacola, Florida* 32505 (DF049310; F49620-77-C-0112)

AF function - this research supports aircrew training, mission readiness, the development of critical combat skills, and the USAF Flight Simulator Procurement Program. Deficiency - modern flight simulators are complex physical systems that simulate other complex physical systems such as aircraft. Because of this emphasis on physical systems, the personnel who design flight simulators are almost exclusively engineers. As a result, flight training simulators usually reflect physical rather than behavioral models. Once the simulator is built and installed in the field, an operational test and evaluation (OT and E) is conducted to determine if the simulator is an effective training device. However, the relationship between training effectiveness and combat readiness is not always clear. This seems to be caused by the lack of an adequate definition of combat readiness which is meaningful in the OT and E/aircrew training context. Objective - this research will determine the relationship between physical models and training effectiveness and recommend ways to translate behavioral models into a form which is understandable by design engineers. A new conceptual methodology for OT and E's will be developed which defines combat readiness in terms which are related to training effectiveness in measurable ways. How research contributes - more effective simulator design and operational testing of that design will occur as a result of the conceptual developments of this research.

The simulator design process will be studied and techniques of using training information to impact the design will be assessed. Ways of communicating instructional considerations to the designer will be studied. Current concepts of operational combat readiness will be articulated through literature search and interviews with appropriate officials. The existing OT and E process will be examined and a new way of stating combat readiness in testable training parameters will be developed. A case study of an ongoing simulator OT and E will be accomplished.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0016, A STUDY OF TURBULENT FLOWS ABOUT OSCILLATING AIRFOILS 13100-E

J.C. Wu, Georgia Inst. of Technology, School of Aerospace Engineering, Dept. of Aerospace Engineering, *Atlanta, Georgia* 30332 (DA0H5578; DAAG29 75 G0147)

To establish a general computational capability for the prediction of turbulent flow fields, which may involve appreciable flow separation and strong viscous-in viscid interaction, associated with finite bodies undergoing arbitrary motion at high Reynolds numbers. Relevance - this research is directly relevant to the AMRDL program of fundamental research on unsteady viscous flows and helicopter blade stall. It is also relevant to the problems of missiles penetrating the wake of another missile or the downwash of helicopter rotors both of which are of interest to MICOM.

The work will utilize the two-equation models of turbulence in conjunction with the integro-differential method of solution of the Navier-Stokes equations for treating the flow past oscillating airfoils at high Reynolds numbers.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0017, COMMUNICATIONS - ION MOLECULE INTERACTION

E.W. McDaniel, Georgia Inst. of Technology, School of Physics, *225 North Ave. N.W., Atlanta, Georgia* 30332 (DN223583; N00014-76-C-0015)

The objective of this work is to accurately measure mobilities, longitudinal diffusion coefficients and invert the experimental data to obtain accurate interaction potentials. These studies are important to the Navy for an improved understanding of gaseous electronic devices and the ionosphere.

The drift velocities and longitudinal diffusion coefficients for positively charged T1 ions in Ne, Ar, N(2), O(2), CO, and CO(2) will be determined over a large range of E/N. The transport properties of negatively charged F, Cl, Br, and I ions in Kr and Xe will be determined. The experimental data will be inverted to determine the interaction potentials. The necessary computer programs will be developed.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0018, DEVELOPMENT OF AN ADVANCED STRUCTURAL INTEGRITY MONITORING SYSTEM (SIMS)

R. Onley, General Time Corp., *1200 Hicks Rd., Rolling Meadows, Illinois* 60008 (DN881380; N62269-77-TS-71218)

To develop a compact airborne system for monitoring 12 strain and other data necessary to evaluate the fatigue life expended in critical structural elements.

Using microprocessors and non-volatile memory chips, a small airborne recorder will be developed weighing not more than 12 lbs. The airborne unit will have a solid state memory. A ground-based interrogator will be capable of putting 10 airplane months of data on one cassette which will be forwarded to NADC for processing. The contract covers five recorders, one ground-based interrogator and a read-out system.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

4.0019, GRAPH THEORY AND COMBINATORICS WITH APPLICATIONS TO DIGITAL SYSTEMS AND NETWORKS

S.L. Hakimi, Northwestern University, Evanston Campus, Technological Inst., Dept. of Electrical Engineering, *633 Clark St., Evanston, Illinois* 60201 (DF043670; AFOSR-76-3017)

AF function - the design of complex networks, such as in electrical transportation, and communications systems. Deficiency - the knottiest problems in this field are combinatorial, and existing methods are relatively few and they do not form a unified theory. Objective - the objective of this research is to develop analysis and design methods that will be useful in solving the various types of network problems. How work contributes - success in this research could lead to significantly better logistics and communications systems in the Air Force.

The main tool will be the theory of graphs, a fairly new field with few experts, but which has surprisingly many applications to sundry and disparate concrete problems. Emphasis will be placed in the areas of invulnerable communications networks,

the construction of codes exhibiting high degrees of automatic error detection or error correcting capability, and digital systems and their fault diagnosis and correction.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0020, COMBUSTOR FLAME STABILIZATION, FUEL SPRAY IGNITION BY HOT SURFACES AND AIRCRAFT FIRE STABILIZATION

A. Lefebvre, Purdue University, School of Engineering, Dept. of Mechanical Engineering, *Executive Bldg., West Lafayette, Indiana* 47907 (DF050030; AFOSR-77-3446)

AF function - advanced air-breathing engines, weapon delivery and defense, transport, aircraft fire safety, vulnerability and survivability. Deficiency - insufficient fundamental understanding of basic processes of ignition and flame stabilization in advanced high temperature, high pressure air-breathing combustors, inability to predict propulsion system performance, insufficient understanding of ignition and stability phenomena related to internal and external aircraft fires caused by engine and fuel system damage. Objective - to formulate realistic analytical representations of the mechanisms and processes of fuel spray preignition, ignition by hot surfaces, flashback, blowoff, and flame stabilization by flameholders, other separated flow regions, and jets. Applications include external fire situations and void space fires, as well as advanced burner concepts, e.g., catalytic, vortex, rapid expansion and premixing/prevaporizing combustors. How work contributes - will provide additional understanding, experimental data and realistic analytical (modeling not now available) of pre-ignition, flashback and blowoff in gas turbine combustors, for ignition of fuel sprays by hot surfaces, for flameholding by objects such as may occur in structural damage to the airframe, and for flow and flame stability in void space fires. Will aid in performance and flame staoilization improvements, will improve hazard assessment for aircraft fires resulting from accidental or combat damage, and contribute to improved aircraft vulnerability and survivability.

Phase I - ignition of fuel sprays will be investigated by injection of a fuel spray into an airflow of known properties passing through a heated pipe section. The influence of spray, air flow, and surface properties will be investigated for each fuel considered. Stabilization of fires by large-scale flameholders is to be investigated in a combustion tunnel initially with V-type and L-type gutters using the water injection method developed by LeFebvre. Exploratory investigations of the flow in partially ventilated enclosures of the type encountered in void-space fire situations will be conducted. Phase II - flashback and blowoff associated with premixing/prevaporizing combustor systems will be studied. A sudden expansion combustor which models aspects of airbreathing combustors will be employed. (Text Abridged)

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0021, INTEGRATED SINGLE FAMILY OR LIGHT COMMERCIAL SOLAR ASSISTED HEATING SYSTEM USING AIR COLLECTORS MADE FROM PREFABRICATED STEEL (ABBREV)

J. Jordy, Solar Engineering & Equipment Co., *Metairie, Louisiana* 70001 (NAS8-32247)

Development of an integrated single family or light commercial solar assisted heating system using air collectors made from prefabricated steel building materials.

Solar Engineering and Equipment Co. will manufacture and deliver two solar assisted heating systems, one residential and one commercial. Both systems use air heating flat-plate collectors. Methods of applying Tedlar glazings will be developed for these collectors. The single family residential system is located in El Reno, OK, and the commercial system is in Lincoln, NE. System performance is monitored by Marshall Space Flight center. (DOE/CS-0010)

SUPPORTED BY U.S. Dept. of Energy, Office of Conservation & Solar Applications, Div. of Solar Applications

4.0022, LOW ENERGY LASERS - MATERIAL ANALYSIS

C.A. Morrison, U.S. Dept. of Defense, Army, Electronics Research & Development Command, Harry Diamond Lab., *2800 Powder Mill Rd., Adelphi, Maryland* 20783 (DA0E5696)

The object of this task is to advance a systematic approach for selecting solid-state laser materials that offer promise as new lasers with predetermined characteristics and for improving existing solid-state lasers and components. Also, those areas of quantum optical technology that may contribute toward the development of new and improved military laser systems are to be investigated.

A parametrized theory of crystal fields has been developed that gives agreement between derived and phenomenological, even-fold crystal-field parameters which determine energy levels and wave functions. The parametrized theory also predicts the odd-fold fields which are needed for intensity calculations and are very difficult to obtain by any other method. The necessary computer programs shall be incorporated with this new theory so that laser related properties of selected materials can be calculated and, thus, the most promising can be selected for further study.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Harry Diamond Lab.

4.0023, INVESTIGATION OF THE REDUCTION OF HIGH DENSITY UNIFORM PLASMAS

D.H. Douglas Hamilton, Avco Corp., *2385 Revere Beach Pkwy., Everett, Massachusetts* 02149 (DF462510; F33615-78-C-2013)

Development of appropriate theories for predicting electron impact excitations of excited atoms and molecules. Calculation of electron impact cross-sections from metastable states for selected atomic and molecular gases. This research directly contributes to the Air Force requirement for high power coherent and incoherent light sources. Cross-sections are not well known for indirect excitations from excited or metastable states. In order to correctly model and control the light source, electron impact cross-sections must be known. Evidence exists that indirect excitations play a very important role in determining the energy balance in gas discharge lasers. This research is of immediate interest in furthering the development of coherent light sources.

The multichannel eikonal treatment will be applied to the excitation processes while the born approximation will be applied initially to the ionization processes. The binary encounter method will be modified so as to treat ionization of molecules. Also, the eikonal approximation will be generalized and applied to ionization. Moreover, certain developments in the theory of ionization will be required so as to provide a description of ionization more accurate than the various theories that are at present available and to derive therefrom relative excitation and ionization probabilities from metastable excited states. The functions to be calculated shall be in the order of priorities listed or as coordinated with the technical monitor. The theoretical methods from atoms and from molecules shall be studied in parallel rather than sequentially.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

4.0024, HYPERSONIC HEAT TRANSFER TEST SUPPORT PROGRAM

V. Dicristina, Avco Corp., *201 Lowell St., Wilmington, Massachusetts* 01887 (DF051170; F49620-78-C-0029)

AF function - aerospace vehicles. Deficiency - unpredicted or poorly predicted transition from laminar to turbulent flow on the nose tips of ABRES shapes has caused numerous severe problems of heating and aerodynamic instability. Ground-based flow facilities do not simulate all of the flow parameters of free flight that influence these phenomena. One facility, which is rather economical to operate, located at the VKIFD, Brussels, is capable of simultaneous simulation of Mach number and Reynolds number of these flights, while not achieving the sustained, realistic running time. Nevertheless, heat transfer and pressure distribution measurements on a number of nose tip shapes of interest to ABRES appears to be desirable. Objective -

to extend and confirm data previously obtained by VKIFD with AVCO support and coordination. How work contributes - the results will help with design of nose tips which ameliorate the problems alluded to under deficiency.

AVCO will supply the model(s) and instrumentation and will coordinate the test schedule with AFOSR and SAMSO to assure that the most appropriate possible measurements are made. VKIFD will run the experiments in the longshot facility. Resulting data will be given to AVCO for analysis, as well as undergoing analysis at VKIFD.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0025, TOTAL ELECTRON CONTENT AND SCINTILLATION STUDIES

S. Basu, Emmanuel College, Graduate School, Dept. of Physics, *400 the Fenway, Boston, Massachusetts* 02115 (DF245980; F19628-76-C-0003)

AF function - communications and navigation. Deficiency - radio fading and timing errors. Objective - improve performance of communication and navigation systems. How research contributes -provides data for statistical models of propagation effects.

Paper chart and magnetic tape record will be analyzed to determine parameters which relate the variations in total electron content and amplitude scintillations to the degradation in performance of navigation and communication systems. The data base will include sites ranging from the auroral zone to the equatorial region and allow for the development of global models depicting the variations in TEC and scintillations.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

4.0026, MERCURY-CADMIUM TELLURIDE ARRAY TECHNOLOGY

R. Broudy, Honeywell Inc., *2 Forbes Rd., Lexington, Massachusetts* 02173 (DN780200; N00173-77-C-0335)

The objective of the program is the development of an infrared detector array and signal processing technology using mercury-cadmium telluride as the detection medium.

Two approaches will be pursued in parallel. The first involves the development of an MIS technology for mercury-cadmium telluride followed by the fabrication of monolithic detector - CCD TDI registers. The second approach incorporates mercury-cadmium telluride detectors with silicon signal processing in a hybrid configuration.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

4.0027, REMOTE SENSING WITH ELECTROMAGNETIC WAVES

J.A. Kong, Massachusetts Inst. of Technology, School of Engineering, Dept. of Electrical Engineering, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (ENG7823145)

This research involves the generation of theoretical models that account for absorption, layering, scattering effects and rough interfaces to facilitate interpretation of passive remote sensing data collected with radiometers and active remote sensing data collected with radars. Efforts are being made to (1) Complete the radiative transfer theory from wave theory that accounts for complete coherence, and (2) Develop the modified radiative transfer theory that incorporates partial coherent effects. The volume scattering effects of the medium are accounted for with a random medium model as well as a homogeneous medium containing Mie scatterers. Available remote sensing data will be interpreted with these theoretical models.

This is a continuation of research previously supported under NSF grant ENG-7601654.

SUPPORTED BY U.S. National Science Foundation, Div. of Engineering

4.0028, THREE-DIMENSIONAL FLOW IN HIGHLY LOADED TURBOMACHINERY

J.E. McCune, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF040230; F49620-78-C-0084)

AF function - advanced gas turbine engine technology. Deficiency -lack of fundamental knowledge of flows through rotating turbomachinery. Objective - develop a technique to predict the flow conditions for highly loaded (high angle of attack) annular cascades in transonic flow. How work contributes - better knowledge of flow fields through turbomachinery will allow the designer to improve present empirical techniques used in designing advanced turbomachinery compressors and turbines.

A step by step procedure is being followed. It is as follows: 1) development of method for three-dimensional incompressible flow through annular cascade, 2) development of method for three-dimensional compressible flow through annular cascade, 3) comparison of results with experiments, 4) generalization of method to include nonuniform inlet conditions and viscous effects.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0029, ROUGH WALL REENTRY HEATING ANALYSIS

M.L. Finson, Physical Sciences Inc., *18 Lakeside Office Park, Wakefield, Massachusetts* 01880 (DF038030; F49620-78-C-0028)

AF function - aerospace vehicles. Deficiency - reentry nose tips are exposed to a number of fluid mechanical phenomena that have been surprising, in the sense that they were not predicted or expected by the designers a priori. One of these is a variety of bistable oscillating flow. This flow switches back and forth between two quasi-steady flow configurations that are radically different in pressure distribution. This effort is intended to provide an a posteriori explanation for the observed results, in the hope that future cases may be predicted, and therefore designed around or otherwise avoided. Objective - to explain the fundamental flow phenomena resulting in a bistable flow oscillation on a reentry nose shape. How work contributes - if a suitable physical model of the bistable phenomenon can be constructed it would show how the difficulty can be avoided by new designs.

Available heat transfer and ablation results, shapes of recovered nose tips, and wind tunnel measurements will be considered in an attempt to construct a composite flow field picture whose behavior agrees with the observed cases. Ablative shape change from cycle to cycle will be considered, along with other possibilities, as a triggering mechanism for the flow switching.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0030, DIELECTRIC LAYER FILTER

R. Pozgay, Raytheon Co., *Hartwell Rd., Bedford, Massachusetts* 02173 (DF901100; F19628-77-C-0111)

Technical objective - the goal of this contract is to evaluate experimentally the performance of a dielectric slab spatial filter. This filter (when placed in front of an antenna aperture) should allow radiation at near broadside angles to pass virtually unattenuated, while severely attenuating radiation at all other angles; it acts as a band pass filter with angle instead of frequency.

A large 35 wavelength antenna will provide the aperture for the dielectric filter. This aperture will consist of 64 elements in two rows and will have the capability of providing both horizontal and vertical polarization. Antenna patterns will be taken with and without the filter present. The separation of the aperture and filter will also be varied and the effects measured. All the measurements will be for both polarizations.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0031, HIGH-DURABILITY MISSILE DOMES - CHEMICALLY VAPOR-DEPOSITED SPINEL AND MAGNESIUM OXIDE

J. Pappis, Raytheon Co., Research Division, *28 Seyon St., Waltham, Massachusetts* 02154 (DN675315; N00014-76-C-0635)

Future tactical missiles of the Navy will need IR domes, radomes and dual mode capabilities. Materials now used are not suited for such applications because the operating environment will impose severe conditions such as mechanical and thermal loading, impact-caused erosion, and effects such as optical and electrical property changes. The possibility of dual mode operation emphasizes the need for greatly improved or novel materials. In addition to possessing useful mechanical, thermal, optical, electrical and chemical properties, such materials must have the potential for being economically fabricable. Chemically vapor-deposited (CVD) spinel, and coated CVD magnesium oxide (MgO) appear to satisfy these requirements. This research task will investigate areas of processing research materials characterization and property determinations which will (1) minimize or eliminate surface deterioration of MgO, (2) establish the suitability of CVD spinel as a potential dome material and (3) develop CVD processes suitable for use in dome fabrication.

The surface protection of MgO and the CVD process for spinel will be investigated in parallel efforts. The best approach will be continued in depth. Spinel will be deposited on MgO by CVD and reactive methods. The purposes are to eliminate or minimize effects of hydrate and carbonate formation and erosion damage. Exploratory CVD spinel runs will be made to obtain small rectangular pieces. Optical, mechanical, and thermal properties of materials produced will be determined (transmittance, image spoiling, strength, elastic modulus, hardness, thermal conductivity, thermal expansion, specific heat, microstructure, environmental stability).

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0032, RELATIONSHIP OF ABLATIVE MECHANISMS TO FIBER PERFORMANCE AGAINST LASERS

E.M. Healy, U.S. Dept. of Defense, Army, Natick Research & Development Command, *Natick, Massachusetts* 01760 (DA0G4271)

The objective of this effort is to determine the mechanisms of ablation and other breakdown pathways, when fibrous polymers and other materials of potential value in individual protection are exposed to infrared CW laser radiation.

Selected polymeric materials will be exposed to controlled laser irradiation to 10.6 microns and other wavelengths of interest. Delineation of breakdown processes will be sought by examination of volatiles, condensible materials and residues, with and without positive removal of ablated material.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center

4.0033, PROPAGATION OF DETONATION THROUGH A NON-UNIFORM HETEROGENEOUS MIXTURE 14417-E

J.A. Nicholls, University of Michigan, Ann Arbor Campus, School of Engineering, Dept. of Aerospace Engineering, *Ann Arbor, Michigan* 48104 (DA0F8962; DAAG29 77 G0104)

To study experimentally and analytically the propagation of a detonation wave through a heterogeneous mixture which the fuel-to-oxidizer ratio may vary along the path. Relevance - this research will improve the understanding of the influence of fuel/oxidizer ratio and side relief on reactive wave propagation that is required for the development of fuel/air mixtures for munitions. It will further contribute to the studies on pressure instabilities in liquid and solid gun propellant burning.

Liquid fuel drops, all of the same size, will be used and the experimental configuration will correspond to cylindrical geometry. Two different drop sizes will be studied. Distributions of fuel-to-oxidizer ratio with radius which will be examined will include the continuously changing case, the case of uniform ratio except for a void in fuel between radii R sub 1 and R sub 2, and the case of a discontinuity dividing the region into two uniform mixture ratio sections.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0034, STUDIES IN THE VISCOMETRY OF SLOW MOTIONS OF RHEOLOGICALLY COMPLEX LIQUIDS 12754-E

D.D. Joseph, University of Minnesota, Minneapolis Campus, School of Engineering, Dept. of Mechanics & Aerospace Engineering, *105 Morrill Hall, Minneapolis, Minnesota* 55455 (DA0R5579; DAAG29 76 G0047)

To perform experimental and mathematical studies on the mechanics of flow of rheologically complex liquids, to develop sets of standard experiments which will lead to reliable viscometric data characterizing rheologically complex fluids. Relevance - the flow properties of hydraulic fluids and lubricants to weapon systems and vehicles are of great importance to the Army. In particular, application to the design of recoil mechanisms, hydraulic power transmission, and the lubrication of aircraft and tank components are obvious examples.

Starting from Noll's formulation for the so-called 'simple' fluid and specifying classes of motion or histories in which the stress response function is manageable, various types of viscometric flow will be solved and checked experimentally.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0035, DEVELOPMENT OF A COMPREHENSIVE RDT/E PROGRAM FOR GROUND SUPPORT EQUIPMENT

J.E. OleJack, C M R Inc., *Toms River, New Jersey* 08753 (DN133406)

To develop a systematized RDT/E program which will define and integrate future ground support requirements with a comprehensive RDT/E effort insuring an optimal operational support capability for future generation aircraft and weapons systems.

Develop a detailed identification of the testing, servicing, maintenance, and handling functions necessary to support aircraft and associated directives, along with organizational structure for the planning and managing of GSE RDT/E. Develop and implement systematic measures to insure prompt consideration of ground support equipment requirements which may be introduced by advancements in airborne systems, changes in support technology, or changes in the operational environment. Develop a long range plan for GSE RDT/E to parallel aircraft systems and technology forecasts.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0036, NOVEL DIGITAL SIGNAL PROCESSING AND DETECTION TECHNIQUES

B. Liu, Princeton University, School of Engineering & Applied Sciences, Dept. of Electrical Engineering, *Box 430, Princeton, New Jersey* 08540 (DF044760; AFOSR-76-3083)

AF function - to advance the theory and design of digital signal processing hardware and techniques for use in Air Force electronic communications and surveillance systems. Deficiency - ever more stringent requirements in the areas of communications, reconnaissance, radar navigation, and flight control create corresponding demands in the area of signal processing. The high prices now paid in weight, size, power consumption can and must be reduced - higher speeds and accuracy are needed as well. Objective - to discover new structures for signal processors, to devise better ways of processing two-dimensional signals, and to find improved statistical methods that can be implemented for signal detection. How work contributes - the results of this research could be directly usable in the design of future Air Force electronics equipment.

New filter structures will be studied in connection with adpative signal quantization. The roundoff error will be investigated in a new class of fast algorithms for the convolution and

DFT. Work will continue in the study of sequential sampling in hypothesis testing applied to detection.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0037, CONVECTIVE IGNITION OF NITROCELLULOSE-BASED PROPELLANTS IN NONSTEADY FLOW FIELDS 15994-E

W.A. Sirignano, Princeton University, School of Engineering & Applied Sciences, Dept. of Aerospace & Mechanical Engineering, *Box 430, Princeton, New Jersey* 08540 (DA0F9242; DAAG29-78-G-0153)

To continue research on convective ignition of nitrocellulose-based propellants to determine the site and mode of convective ignition of cylinders in cross flow and to determine the influence of igniter gas composition on the ignition events. Relevance - the results of this research can be incorporated in packed bed propellant studies that are of mission interest to both the ignition and the gun propulsion technology programs of the large caliber weapons systems lab.

A model is being developed which includes heat-up to gasification, flow of reacting gases around a specified cylinder geometry, and accumulation and reaction of combustion intermediates in the flow wake.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0038, ELECTRIC GENERATOR DEVELOPMENT FOR 1980

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To determine the approximate handling, servicing, maintenance and test systems and configurations as well as the associated cost requirements for existing and future aircraft electrical ground support equipment which will conform to the proposed revision of Mil-Std-704.

(A) determine the specific operational support requirement. (B) investigate the possibility of updating present inventory equipment and the associated data. (C) investigate the technology, feasibility, and costs associated with new systems development to meet the new requirements. (D) develop breadboard mock-ups of modified and/or new support system designs. (E) evaluate these mock-ups and formulate recommendations for system development actions.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0039, PLASMA DYNAMICS FOR POPULATION INVERSION

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AF function - operation of high altitude vehicles in a post nuclear explosion environment, development of electromagnetic weapons, space and ionospheric communications as well as countermeasures demand fundamental understanding of energy transformation processes occurring in plasmas such as x-ray lasing media. Deficiency - the aforementioned information required to design advanced equipment is not available today. Its acquisition may be realized by well-planned theoretical and experimental research. Objective - this project will investigate theoretically the fundamental characteristics of energy transformation processes. It will specifically study the plasma dynamics aspects of population inversion for x-ray lasing media. Contribution - this work is part of a comprehensive program of plasma research for the development of an x-ray radiation source for simulation of nuclear weapon effects, the development of advanced electromagnetic weapons (laser and particle beam) the development of space and ionospheric communications and the development of countermeasures.

This project will perform theoretical work to understand the energy transformation processes occurring in x-ray lasing media, taking into account the fluid dynamic aspects of the system. It will perform a consistent description of a time varying reacting plasma. The macroscopic description which will be incorporated in the theory is that of a freely expanding cooling aggregate. Here one is mainly concerned with the effects that such fluid dynamics have upon the population densities of the excited states. For the realization of a high-power x-ray lasing medium it is important to study the aforementioned dynamics in the limit of high densities. Where possible, realistic (experimentally found) cross-sections will be incorporated into the theory. In addition to the foregoing they will study the effects that the lasing radiation has upon the level populations. This effort will be closely coordinated with the main experimental x-ray laser program performed at the University of Rochester as well as the other satellite efforts (Boston College, Toronto, St. Louis and Maryland).

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0040, NAVY VEHICLE DESIGN AND CONSTRUCTION - TRANSONIC ANALYSIS OF TWO-ELEMENT AIRFOILS

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This research is directed towards developing a completely theoretical solution to the analysis and design of transonic two-element airfoil configurations. The use of such two-element airfoil configurations such as slats has improved performance of combat aircraft at transonic speeds where air-to-air combat usually occurs. However, the reasons for the effectiveness of slats or flaps at transonic speeds are not presently well understood and good slat or flap designs are experimentally arrived at through expensive wind tunnel test programs.

A three phase program is being conducted to develop a systematic and efficient numerical procedure for the design of multi-element airfoil systems for high lift at transonic flight conditions. Under the two completed phases a viscous transonic flow analysis has been developed. The procedure predicts pressure distributions and force and moment coefficients for multi-element configurations with boundary-layer effects included. The current phase is concerned with the development of an effective inverse method to determine multi-element airfoil systems by specifications of a desired pressure distribution and free stream Mach number.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0041, THEORETICAL STUDIES OF WAVE PROPAGATION IN LAMINAR BOUNDARY LAYERS

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The instability of laminar boundary layers and the associated transition to turbulence are extremely complex phenomena that have major effects on the performance of aircraft and missiles throughout the speed range. An increased understanding of these occurrences, coupled with an improved predictive capability, could lead to a significant improvement in vehicle performance, particularly as regards range and fuel economy. The proposed research will study, theoretically, the propagation of waves through laminar boundary layers at high subsonic speeds emphasizing the nonlinear interaction of the wave with the boundary layer.

The stability of the laminar boundary layer will be studied by finite difference techniques, for the flow past a flat plate at high subsonic speeds. Disturbances will be introduced at the upstream, downstream and outer boundaries. The propagation and distortion of the disturbances, and the associated modifications of the flow, will be calculated using second order compressible boundary layer theory. The influence of disturbance amplitude and wavelength will be investigated.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0042, MICROWAVE, ELECTROMAGNETIC THEORY AND INFORMATION PROCESSES (JSEP)
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AF function - electronic research is essential to all Air Force missions and functions, especially aerospace reconnaissance, communications, surveillance, navigation, command and control of operating forces, and gathering, processing, and transmission of intelligence and information. Technology for all of these functions requires more compact, lower power consumption, higher sensitivity and more reliable electronic components. Opportunity - this technology is dependent on continued research on properties of electronic materials, circuits, and systems. Objective - the Joint Services Electronics Program (JSEP) provides the research baseline in the electronic sciences for all three military services. How work contributes - jointly and equally supported and managed by the Air Force, Army and Navy, this program provides the DOD with a hard core electronic research capability which includes a highly flexible, quick response to new research opportunities over a braod area of electronic science and engineering.

The JSEP effort addresses itself to research in electromagnetics and waveguide techniques, quantum electronics and optics, solid state electronics and materials, communications and computers, and systems, control and network theory. The part under task 2305/A9 entails problems of propagation, guiding and scattering of electromagnetic and acoustical waves, of interaction of high energy density waves and materials, as well as problems in solid state electronics concerning electric, magnetic, acoustic and optic interactions in solids and related devices. The JSEP effort addresses itself to research in systems theory, network analysis, communications theory, and image processing. Work in modeling FM receiving channel interference continues. New work commences in developing models for image processing.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0043, UNSTEADY BOUNDARY LAYER FLOWS
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AF function - aerospace vehicles. Opportunity - of prime interest for the future will be the ability of the scientist and engineer to model flows with unprecedented accuracy, thereby minimizing the costly consequences of small errors in estimating the static and dynamic loads over a wide variety of shapes and configurations. The major communicating link between a body and the moving fluid in which it is immersed is the boundary layer. An important unresolved feature of this boundary layer is its stability and transition to turbulence in response to time varying (unsteady) inputs such as might result from a maneuver. While the mean characteristics of the unsteady laminar boundary layer have been studied to some extent and are believed to be reasonably well understood, the transition of this laminar boundary layer to turbulence and the turbulent boundary layer which develops from this unsteady initially laminar flow have not been looked at in any detail. A unique way of studying, experimentally, the stability of unsteady viscous flows, particularly of transient as distinct from periodic flows, is by use of a Ludwieg tube as anticipated in this research effort. Objective - to study analytically and primarily experimentally the stability and transition characteristics of unsteady laminar wall boundary layers as well as the features of the turbulent flow at long times following passage of a finite wave over an observed measuring station in a Ludwieg tube. How work contributes - a major objective of this research effort will be to exploit the great flexibility of the expansion (Ludwieg) tube as regards independent variations of pertinent flow conditions which determine the basic similitude parameters.

The experimental program has concentrated on obtaining transition-time data by thin-film detection for a range of the parameters involved. It appears desirable to employ other diagnostic techniques as well. For that purpose a special hot wire probe is under construction and will be used to sense velocity fluctuations within the boundary layer itself. The theoretical investigation of the expansion wave boundary layer stability is based on a linearized small disturbance analysis using the method of multiple scales.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0044, COOPERATIVE INVESTIGATION OF THE NOISE PRODUCING REGION OF AN AXISYMMETRIC JET
W.K. George, State University of New York, Buffalo Campus, School of Engineering & Applied Science, Dept. of Mechanical Engineering, *3435 Main St., Buffalo, New York* 14214 (DF051640; F49620-78-C-0047)

AF function - advanced aerospace vehicles. Opportunity - fundamental understanding of the sources of noise and vibration caused by mixing gaseous flows is not available. Recent investigations provide evidence that coherent structure of the turbulent flow field either is the source or the carrier of the source for the radiated acoustic energy. This effort provides the opportunity to investigate the correlation between the coherent structure of a jet and its radiated noise and also to investigate the existence of coherent structure in the midfield of a jet flow field and techniques for its detection. Objective - comprehensive study, both experimental and analytical, of the turbulence structure of low Reynolds number jets and its relation to jet noise. How work contributes - noise radiated from jet mixing flows are not only unpleasant from an environmental standpoint but induce vibrations within the solid structure of the vehicle and adjacent structures reducing system reliability and fatigue life. Better understanding of the physics involved in the jet flow field and resulting acoustic energy will allow more efficient and reliable components such as jet exhaust nozzles, jet pumps and augmented jets.

The investigation will study RE lower than that at which visually observable structures disappear and will be carried out as a three university effort at SUNY, Buffalo, the University of Minnesota and the Illinois Institute of Technology. All three investigations will be experimental and will be carried out on similar axisymmetrical jets at identical Reynolds numbers. To insure similarity, traditional turbulence measurements (turbulence intensities, etc.) will be obtained on each apparatus for comparision. The SUNY will apply Lumley's orthogonal decomposition to the velocity and temperature fields, the University of Minnesota will apply orthogonal decomposition to the radiated noise field and the Illinois Institute of Technology will resolve the observable velocity structures by visualization techniques. Detailed analysis of these data will attempt to resolve the existence (or nonexistence) of the relationships between the coherent structures and the acoustic radiation field.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0045, SENSOR DEVELOPMENT
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To reduce cost of electro-optic sensors.

New improved cameras based upon internal photoemission from Schottky barrier arrays offer the possibility of a more than ten-fold reduction in the cost of infrared thermal imaging systems. Applications of these cameras include night attack, navigation, weapons delivery, and passive non-cooperative identification and classification of aircraft. Prototype cameras are evaluated to determine their performance characteristics including resolution, temperature sensitivity, operating parameters and noise.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0046, TACTICAL TARGET IDENTIFICATION SIMULATION
R.J. Wood, U S. Dept. of Defense, Air Force, Rome Air Development Center, *Griffiss Air Force Base, Rome, New York* 13441 (DF742110)

The purpose of this effort is to develop a TTI (tactical target identification) simulation capability to evaluate specific radar identification techniques (RCS, Doppler, imaging). This in-house effort will provide a means for evaluation and focus of the TTI contractual program as well as serve as a vehicle to demonstrate this technology to users.

The technical approach to the TTI simulation program will be to instrument the TTI laboratory with the appropriate computing power. This shall be realized with existing government-owned equipment and integrating the necessary peripherals. The necessary data processing algorithms will be developed on this system in conjunction with contractor-furnished software and applied to the demonstration of interactive aircraft identification and classification functions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0047, MOLECULAR INTERACTIONS WITH MANY-BODY PERTURBATION THEORY

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AF function - this research contributes to RO 6.3, electromagnetic weaponry. Deficiency - more accurate and efficient methods for calculating potential energy hypersurfaces are needed. Objective -many-body perturbation theory will be adapted to the study of molecular interactions. Contribution - further understanding of intermolecular interaction phenomena will assist in the development of high-power lasers.

Research is directed toward developing new, efficient, and more accurate methods for first-principle quantum mechanical determinations of molecular interactions in order to determine parts of energy hypersurfaces for ground and excited states. Since a predictive theory of potential energy surfaces is required, the approach must exceed the Hartree-Fock self-consistent-field method in accuracy and must include correlation. The method being pursued is a natural extension of Hartree-Fock theory based upon the linked-cluster expansion and many-body perturbation theory. MBPT possesses advantages that make it attractive for the calculation of energy surfaces.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0048, CHEMICAL DYNAMICS AT THE GAS-SOLID INTERFACE - COLLISION-INDUCED ELECTRONIC TRANSITIONS

G. Wolken, Battelle Memorial Inst., *505 King Ave., Columbus, Ohio* 43201 (DF046010; F49620-77-C-0004)

AF function - this proposed research primarily falls in the 6.3 research objectives which deal with the development of high energy lasers. The specific problem under consideration will be the dynamics of reactions occurring at the gas-solid interface. A novel pumping mechanism for infrared lasers could result from this study, and the subsequent developments and refinements will have important technological consequences. Deficiency - in the development of any laser the main step is to achieve the correct population inversion of the system. With the large variety of possible gas-solid interactions (including various crystal faces and alloys), a preliminary computer screening to identify necessary characteristics for population inversion is needed to provide valuable guidelines for experimentation. Objective - the present proposal addresses two extensions of the model, (1) the role of surface atom motion in determining desorption dynamics, (2) the specialized energy requirements for adsorption and how the adsorption process affects the momentum distribution of the adsorbed particles. Contribution - this research is a part of a comprehensive program in statistical mechanics.

Using computer simulations, it is proposed to study the energy requirements (vibrational, rotational and translational) for adsorption of a gas-phase molecule on a solid surface. The role of the gas-solid potential for different types of surfaces and various lattice dynamics for the surface atoms will be investigated. The importance of these effects in promoting adsorption will be assessed. Battelle researchers have developed a model to describe the interaction of diatomic and triatomic gas molecules with solid surfaces. Work currently in progress at Battelle under AFOSR sponsorship is using this model to investigate the dynamics of recombination and desorption of adsorbed atoms to elucidate conditions under which useful amounts of vibrational energy will appear in desorbing molecules. This, in turn, affects the desorption dynamics and, hence, the feasibility of obtaining useful amounts of vibrational energy.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0049, EFFECT OF BODY FORCES ON MOTION AND HEAT TRANSFER OF CONFINED FLUIDS

S. Ostrach, Case Western Reserve University, School of Engineering, Dept. of Engineering, *University Cir., Cleveland, Ohio* 44106 (DF046540; AFOSR-77-3171)

AF function - advanced aerospace vehicles. Opportunity - improve efficiency of electronic equipment cooling systems, waste heat disposal and fuel cooling systems. Objective - to increase the understanding of confined flows and heat transfer relevant to fuel and hydraulic systems, tankage, and aircraft equipment environmental control. How work contributes - this work is building a step by step understanding of flow features and configurations that are common, albeit poorly understood, features of vehicle equipment operation. Any increased understanding of these flows will yield hydraulic fuel and temperature control systems of better performance and decreased weight.

Experiments will be performed on heat transfer augmentation by thermal instability, on natural convection with multiple heat flow directions, on the interaction of a buoyant plume in a stratified environment, and on convection due to combined temperature and concentration gradients. Papers will be prepared describing completed work.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0050, RECEIVER CONCEPT AND EVALUATION

J.B. Tsui, U.S. Dept. of Defense, Air Force, Avionics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF097990)

The in-house capability to be established under this effort will provide a much needed service to the operational commands deploying EW receivers and to the exploratory and advanced development programs attempting to advance the state of the art. Specific objectives include the capability to evaluate and calibrate passive receiver systems operating from 50 MHz to 40 GHz and to define standards which will support systems under development. In addition, new concepts developed by laboratory engineers and contractors will be evaluated and demonstrated under the program.

In-house laboratory equipment will be acquired (through purchase and use of existing equipment identified in other divisions) and integrated into a semi-automated capability. Initial work will emphasize the frequency ranges that existing equipment provides, resulting in minimal new purchase of equipment. As experience is gained in measurements, the program will expand to new concept evaluation and demonstration.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Avionics Lab.

4.0051, ERDA-DOE/NASA PROPULSION SYSTEM R AND D FOR ELECTRIC AND HYBRID VEHICLES

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The objective of this work is to provide the propulsion system research and technology required to support DOE's Electric and Hybrid Vehicle Systems program. This will be accomplished through contracts with industry and university grants supported where appropriate with in-house research projects. The projects will be planned to provide new electric and hybrid propulsion technologies required to permit the DOE Vehicle Systems program to meet its objectives. Responsibility for propulsion research and technology is assigned to NASA by DOE under Interagency Agreement No. EC-77-A-31-1044, dated May 20, 1977. All basic and applied research plus engineering development necessary to improve, advance, and/or

evolve new components and systems are included in this effort. Initial work addresses improving existing components such as motors, controllers, etc., to be followed by research and development eventually resulting in significantly advanced concepts.

SUPPORTED BY U.S. Dept. of Energy, Div. of Electric Energy Systems

4.0052, STRONG OPTICAL SCATTERING IN ATMOSPHERIC TURBULENCE

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AF function - electro-optical communications systems have defense applications which include indication and warning and weaponry. Opportunity - aberrations in optical propagation paths due to atmospheric turbulence may be corrected if the effect of the turbulent scattering is more clearly understood. Objective - the purpose of this research is to collect and analyze detailed statistical data on strong optical scattering in a well characterized laboratory medium. Results will be used to verify or modify recently developed theoretical descriptions of the scattered field as a function of all pertinent variables. How work contributes - high levels of atmospheric temperature turbulence distort electro-optical signal propagation. The phenomenon, which is not yet well understood prevents optical systems from achieving their diffraction limited capabilities. This project should provide a better understanding of the situation and allow improvements or compensations to be made for such optical systems.

The approach to be taken will be to construct liquid-filled scattering chamber. Atmospheric turbulence in the mdeium will be simulated by inserting transparent glass beads whose index of refraction is nearly that of the liquid. A low power, highly coherent laser is intended for use as a virtual point light source with scattering measurements being made by high resolution optical instrumentation. Data collected will include evaluation of the variance of irradiance, the detailed covariance shape, and high moments and their probability distributions as a function of strength of turbulence.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0053, OPTICAL DATA PROCESSING

D. Casasent, Carnegie Mellon University, Inst. of Technology, Dept. of Electrical Engineering, *Frew Ave. & Margaret Morrison, Pittsburgh, Pennsylvania* 15213 (DF041370; AFOSR-75-2851)

AF function - advanced terminal guidance processors will permit maneuverable reentry vehicles to take evasive action while ensuring accuracy of delivery. Opportunity - the fundamental difficulty in achieving a practical terminal guidance system lies in real-time correlation of the stored reference image with an input image that differs in scale, aspect, contrast, and even content when sensed in a different spectral band or at a different time than the reference image. The most promising technology is optical processing with its increasing repertoire of space-variant data processing operations. Objective - the proposed research will investigate the problems associated with differences between input and reference imagery in missile guidance, and will devise appropriate optical pattern recognition techniques and systems to overcome these problems.

The following projects will be pursued: evaluation of candidate real-time light modulators, modelling the effects of correlation degradations due to the various differences that occur between the input and reference imagery, improvement of image registration by employing light modulators to produce phase modulated input data, performance of optical correlation of data from one sensor with that of another to assess SNR and correlation degradation, investigation of the optical analog to the invariant moment method used in digital pattern recognition, and performance and analysis of correlations involving IR tank imagery, millimeter wave imagery, and imagery in which transmittance is proportional to altitude and terrain slope.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0054, ASW POD FOR CV TACTICAL AIRCRAFT

C. Phillips, U.S. Dept. of Defense, Navy, Naval Air Development Center, *Warminster, Pennsylvania* 18974 (DN581412)

Minimize problems in fleet antisubmarine warfare relay systems by supporting NavAir, NAFI, and contractors with facilities and technical staff essential for evaluation of total system and/or components for development through production and use.

Operational requirement (OR ASW 30) established the parameters and guidelines for the development of an ASW POD which will provide tactical aircraft with a sonobuoy dispense and signal relay capability. Work also being performed on contracts as reported in work units SX301 B, SX301 B3, and VR101B.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Avionics Facility

4.0055, LIVE CREWSTATION MOCK-UP AND DYNAMIC FLIGHT SIMULATOR

R.J. Crosbie, U.S. Dept. of Defense, Navy, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate, *Warminster, Pennsylvania* 18974 (DN881417)

To develop a generic dynamic crewstation capable of being efficiently inserted in the gondola of the NavAirDevCen centrifuge and used as a pilot controlled dynamic flight simulator for current and advanced aircraft. This development effort includes the design and fabrication of the necessary hardware required to accommodate advanced cockpit/systems, e.g. displays, controls, seats, restraints, etc. It will also include the identification, refinement and verification of various software tasks required to control and operate the simulator. All directorates that use or may use dynamic simulation at NADC will be contributing to the development of this station.

This development effort will include the inputs of the Center S directorates as outlined in the background statement and includes the following tasks: (1) Design and building of physical cockpit will be a multiple directorate effort. (2) The development of the methods for the optimum simulator drive will use personnel and information from the Facilities (TSD) and the Life Sciences Division (ACSTD). (3) The aerodynamics will involve the Flying Qualities Branch of Aero Design and Propulsion Division (ACSTD). (4) The controls and force feels will include inputs from the Aircraft Systems Division (SCSTD). Displays and systems integration will be coordinated through the Systems Project Director for AIDS and Systems Simulation Division (SD).

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0056, SIMULATION DEVELOPMENT SCENE GENERATOR SYSTEM

R.L. Jones, U.S. Dept. of Defense, Navy, Naval Air Development Center, Systems Directorate, *Warminster, Pennsylvania* 18974 (DN233164)

Research and develop the simulation capability to generate visual cues an air crew requires to accomplish earth oriented operations such as landing on surface ships, air-to-ground weapon delivery and air-to-air combat.

The scene generator capability is being developed in several phases. The initial phase included the design of the gantry system and the development of the optical probe. The second phase is the development of the space and the lighting system. The third phase is the integration of the gantry, lighting and a terrain model and ship model with sea scape.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0057, TRENDS IN DIGITAL COMPONENT TECHNOLOGY AND THEIR EFFECTS ON SEQUENTIAL COMPUTER PROCESSING RATES

G.M. Dick, University of Pittsburgh, Johnstown Campus, Undergraduate School, Dept. of Engineering Technology, *Johnstown, Pennsylvania* 15902 (DF051450; AFOSR-78-3540)

AF function - aerospace vehicle design and operation. Deficiency -three-dimensional aerodynamic design is at present not

computationally feasible. Opportunity - new computer architectures and associated computational algorithms might be able to do the problem. How work contributes - by establishing limits of advantage attainable by specialized computer architecture.

Computational algorithms contain both sequential and vector operations. Pipeline and parallel computer speed can be limited by necessary sequential operations. The proposal attempts to estimate the needed and attainable speed of sequential computation in order to do three-dimensional aerodynamic design. This study will directly address processing rates of sequential machines only. Extrapolation of these results to vector machines is not a main item within the investigation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0058, AIRBREATHING ENGINE SIMULATOR EVALUATION

L.L. Galligher, Arnold Research Org. Inc., *Arnold Air Force Base, Tullahoma, Tennessee* 37389 (DF420772; F40600-77-C-0003)

Investigate various problems and test techniques associated with integrated nozzle-afterbody testing in transonic wind tunnels.

Provide a data base from which an evaluation can be made of the test techniques currently used to determine the performance of integrated airframe-propulsion systems. Based on this evaluation, new procedures can be initiated where needed to improve the wind tunnel test capability. In addition, the results of this project will provide a means of identifying influences of wind tunnel generated disturbances on test data.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Arnold Engineering Development Center

4.0059, UNSTEADY AERODYNAMIC

T. Hsieh, Arnold Research Org. Inc., *Arnold Air Force Base, Tullahoma, Tennessee* 37389 (DF421058; F40600-77-C-0003)

Study the approach to determining whether high-angle-of-attack unsteady aerodynamic forces can be isolated and recovered from wind tunnel test data.

Sources and effects of unsteady flow on wind tunnel test data will be investigated. Evaluate hardware requirements for unsteady aerodynamic data extraction.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Arnold Engineering Development Center

4.0060, LASER VELOCIMETER MEASUREMENTS OF THE FLOW OVER MISSILES AT HIGH ANGLES OF ATTACK 14761-E

K.E. Harwell, University of Tennessee, Knoxville Campus, Graduate School, *W. Cumberland Ave. S.W., Knoxville, Tennessee* 37916 (DA0F9002; DAAG29 77 G0138)

To utilize a three-dimensional laser Doppler velocimeter (LDV) to measure the velocity distribution and vortex structure in flows over missiles at high angles of attack. Relevance - a quantitative understanding of the flow field structure about missiles at high angles of attack is directly relevant to the development of highly reliable, accurate, and maneuverable missiles.

Simultaneous three-dimensional velocity measurements at a point in a flow established about bodies of revolution at high angles of attack in both subsonic and supersonic wind tunnels will be made using both a dual-scatter LDV and a reference beam LDV system. Measurements will be made both in the boundary layer and vortex wake regions.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0061, INVESTIGATION OF ADAPTIVE OBSERVERS FOR THE HUMAN OPERATOR IDENTIFICATION PROBLEM

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AF function - in the design of high performance control systems, accurate models of the pilot dynamics are necessary to properly account for the pilot as a control element. Deficiency - pilot models can be used to perform stress tests which might be harmful or undesirable to subject humans to such as nuclear irradiation, hypoxia, severe acceleration due to extremes of aerial combat maneuvers, and responses due to temperature and vibration. Objective - the real-time identification problem as regards aircraft pilot modeling and parameter identification as currently under study by the USAF School of Aerospace Medicine will be examined. How research contributes - the research will enhance the development of on-line identification algorithms for identifying time-varying models, both linear and nonlinear. The resulting computer algorithms will be useful in obtaining accurate, reproducible pilot transfer function models which are of great importance in predicting accurate responses for human stress studies.

New identification approaches will be developed, and an investigation of the identification algorithms via computer simulation will be verified.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0062, MEASUREMENTS IN THE LASER IRRADIATED EYE

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AF function - Air Force personnel may be exposed to a wide spectrum of radiation hazards in the operation of aircraft and weapon systems. This spectrum includes laser energy. The results of the measurements proposed should substantially contribute to work being conducted by USAFSAM in TPO II, radiation hazards. Deficiency - techniques are needed to develop microsensors which are capable of acquiring data in the pulse duration phase associated with most Air Force lasers. It seems probable that the development of these microsensors will add substantially to the attainment of means of direct measurement of temperatures during short duration exposure of the eye and for small retinal images. In addition, the investigators will measure the transmission properties of the monkey eye by the use of a dye laser. Objective - this research will lead to intensity and electrical activity within the laser irradiated eye. In addition, measurements of the transmission properties of the eye will be accomplished with the use of a dye laser. How research contributes - the need for determination of safe retinal exposure levels to high intensity visible light increases each year. The health hazards of these sources cannot be properly evaluated until we increase our knowledge of the nature of the damage mechanism and are better able to measure these effects. This research will afford the means to more accurately assess and quantify the effects of laser irradiation on the eye.

Measurements in the laser irradiated eye will be made by the insertion of newly developed fiber optic probes as well as from combination fiber optic-thermocouple probes and combination electrode-thermocouple probes. The probes will be inserted in monkey eyes. By scanning the animal through the laser beam, it should be possible to produce high quality two-dimensional intensity profiles of the retina. Also simultaneous light-temperature recording or ERG-temperature recordings will be made using the rabbit and/or monkey.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0063, THREE-DIMENSIONAL FRACTURE

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AF function - advanced aerospace flight vehicles and propulsion systems require improved damage tolerance. Deficiency - the inability to accurately and efficiently assess fracture and crack growth which involve three-dimensional behavior seriously limits the Air Force capability to develop a realistic structural damage criteria. Objective - objective of this theoretical research is to investigate the three-dimension behavior of surface and corner cracks with particular attention being given to the

region where the crack intersects the structural free surface. How work contributes - the research directly contributes to the Air Force research effort seeking to develop a realistic three-dimension fracture criteria and crack growth law which has experimental validity.

This research effort, using the three-dimensional theory of elasticity, will study the behavior of surface and corner cracks. The stress singularity behavior at the intersection of a corner crack and free surface will be studied. In addition, for surface cracks the stress distribution in the vicinity of the crack surface will be determined and the influence of the rear surface proximity studied. Using perturbation analysis the advancement of a crack front will be investigated in an effort to explain 'tunneling' behavior.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0064, THEORETICAL BASIS OF THE FLOW TURNING EFFECT IN COMBUSTION STABILITY

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AF function - weapons delivery. Deficiency - all developments in rocket technology (tactical or strategic) are subject to at least the possibility of unstable combustion. Objective - this theoretical analysis will improve the basic understanding of the 'flow turning' effect which has been incorporated empirically into the most-used solid propellant combustion instability models. How work contributes - the result of this work should be clarification of assumptions and improved understanding of 'flow turning', as it is presently used in combustion modelling.

The existing theory will be reviewed and reformulated to clearly define assumptions and approximations already made. In a second phase the relationship between one- and three-dimensional problems will be studied. In a third phase, time permitting in this one year program, some simple 'flow turning' models will be investigated and numerical results produced.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0065, MULTIPLE WAVELENGTH SIGNATURE STUDY

J. Wilson, General Research Corp., *7655 Old Springhouse Rd., McLean, Virginia* 22101 (DF911380; F30602-78-C-0082)

To determine the nature of target observables and their interaction with high frequency active sensors in the micron to millimeter region of the electromagnetic spectrum. Air Force strategic surveillance systems require the capability to retain full operational performance for all system scenarios and environments to be encountered. These systems must obtain repaid and confident detection, classification and identification of military targets by utilizing vital target signature information. The utility of extant computer programs for modeling real-world strategic targets, such as spacecraft and aircraft has not been adequately demonstrated throughout the micron to microwave portion of the electromagnetic spectrum. Comprehensive field measurements do not represent a cost effective approach without a preliminary selection of the most promising combination of wavelength and system parameters.

This proposed effort will demonstrate a simulation capability for target observables with an accuracy adequate to predict and evaluate the system performance of advanced surveillance concepts. This study will (a) demonstrate the utility of extant computer simulations for strategic surveillance sensor evaluation, (b) improve the methods of treating the complex geometries of strategic threats, and (c) establish the basis for extrapolating a basis for the microwave codes using either the optical or millimeter codes or by establishing the microwave codes independently.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0066, THREE-DIMENSIONAL DISTURBANCES IN HIGH SPEED BOUNDARY LAYER FLOWS

G.R. Inger, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Aerospace Engineering, *Blacksburg, Virginia* 24061 (DF045690; F49620-76-C-0013)

AF function - advanced aerospace vehicles. Opportunity - provide better understanding of the structure and mechanisms of flow separation/reattachment with their attendant three-dimensional effects on pressure distribution, skin friction and heat transfer phenomena. Objective - investigate the twin problems of flow separation/reattachment and three-dimensional effects in high speed boundary layer flows along two-dimensional and axisymmetric bodies. How work contributes - better understanding of these phenomena will be directly applicable to the design of future aerospace vehicles.

A theoretical study will be established with the objective of developing a fundamentally sound yet engineering-oriented analytical approach from which skin friction, heat transfer, and wave drag can be predicted as function of Mach and Reynolds number, wall temperature ratio and vortex parameters.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0067, DICE THROW DATA ANALYSIS (HARD FLUSH AIRCRAFT SHELTER)

J.C. Pyle, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DF190550; F29601-77-C-0086)

The objective of this project is to analyze the dice throw data for the Boeing Aerospace Company's hard flush aircraft shelter concept model. The test phenomenology and its implication on the Boeing shelter design will be based on the data analysis. This project will result in a report summarizing data results, analysis results and analysis/test correlation.

This project will require data review, damage review and assessment, prediction analysis review and assessment, new analysis based on measured load data in overpressures and soil pressures, and analysis/test correlation. The dice throw test simulated the air overpressure and ground shock weapons effect on the one-third scale hard flush aircraft shelter. The test prediction analysis approach was the same approach as the design analysis for these weapons effects. The same approach or an expansion of it will be used for analysis/test correlation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Weapons Lab.

4.0068, REFRACTING GAS PRISM AND AERODYNAMICS OF ELECTRON BEAM DISCHARGES

W.H. Christiansen, University of Washington, School of Engineering, Dept. of Aerospace & Astronautics, *206 Guggenheim Hall, Seattle, Washington* 98105 (DF026720; AFOSR-74-2650)

AF function - weaponry. Opportunity - some fluid mechanical flows have promise for performing as optical elements for handling the light output of high power lasers at power densities higher than those possible with solid state mirrors, lenses, prisms, and windows. Objective - to both theoretically and experimentally study aspects of fluid mechanical optics that might lead to new optical systems useful for laser technology. An additional objective is to study fundamental principles involved in the interaction of electron beam discharges with gas dynamic flows. How work contributes - this work will determine at what energy densities and for what time periods light can be stored in a fluid mechanical storage ring. It will also elucidate the fundamental processes occurring in the interaction of electric discharges with supersonic gas flow in a closed channel.

Experiments will be carried out on the 360-degree Venus machine. Other experiments will investigate the flow-electric discharge interaction using a Ludwieg tube and a plasma diode.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0069, FINITE ELEMENT METHODS IN FLUID DYNAMICS

N. Geffen, Tel Aviv University, *155 Herzl St., Tel Aviv, Israel* (DF048990; AFOSR-77-3345)

AF function - aerospace vehicles. Opportunity - both present and future Air Force aerospace vehicles will be required to fly at high speeds and have an ability to maneuver at all speeds. This will require that new and improved engineering design and analysis methods be developed throughout the total speed regime for the precise engineering determination of the performance and system capabilities of these vehicles. Objective - this research will attempt to develop new methods for fluid dynamical analysis using high speed computers, methods which circumvent the disadvantages of currently employed machine algorithms. How work contributes - the ability to perform aerodynamic calculations about complex (real) shapes using finite element methods which are becoming standard in structural analysis could lead to great improvements in efficient use of computers as engineering design and analysis tools. Resolutions of the variational problems underlying the use of such finite elements will do much to bolster engineering confidence in the (numerical) finite element methods, thereby giving the engineer an added and vital tool for use in predicting the 'grand ensemble' vehicle flow field.

This research will investigate the possibility and feasibility of using variational formulations to obtain finite element analysis and procedures for the solution of quasilinear hyperbolic and mixed initial value problems, with application to unsteady flow about bodies, time dependent simulation of aerodynamic phenomena in all speed ranges, steady transonic flows (including the case of the super-critical wing) and to internal gasdynamic flows (e.g. cascades and inlets).

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production and Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, NAVY ENVIRONMENT - AEROSOL COMPOSITION

G.A. Dawson, University of Arizona, Inst. of Atmospheric Physics, *Tucson, Arizona* 85721 (DN123034; N00014-77-C-0099)

In the interest of improving the forecast model for marine fog, the objective of this research is to furnish data on the chemical character of the marine aerosol around marine fog forms.

The technique for sampling the aerosol makes use of a cooled hemisphere on which a condensate from the atmosphere forms. From a measurement of the relative humidity and the volume of condensate, the volume of atmosphere sampled can be computed. By using a bank of collectors operating at different temperatures down to -6 C, it is possible to say something about the proportion of nuclei active at various temperatures.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0002, INVESTIGATION OF SOLAR-TERRESTRIAL EFFECTS ON ATMOSPHERIC ELECTRIC FIELDS IN ANTARCTICA

R.A. Helliwell, Stanford University, School of Engineering, Dept. of Electrical Engineering, *Stanford, California* 94305 (DPP7821712)

The earth's fair weather electric field will be measured at South Pole and Vostok Stations in Antarctica for a period of two years beginning in the austral summer of 1979-80. The electric field data will be used in conjunction with solar and geomagnetic data to investigate solar terrestrial effects associated with solar flares, solar magnetic sector boundaries, and transpolar magnetospheric convection electric fields, during the third year of this grant.

Logistics support is required for one person to visit Vostok and South Pole Stations during the austral summers of 1979-80 and 1980-81.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Polar Programs

5.0003, ANALYSIS OF STRATOSPHERIC TRANSPORT PROPERTIES

G.D. Nastron, U.S. National Aeronautics & Space Admin., Office of Aeronautics & Space Technology, Ames Research Center, *Moffett Field, California* 94035 (DF580480)

AF function - environmental impact statements (EIS) of high altitude Air Force operations. Deficiency - current or anticipated AF operations in the stratosphere and upper troposphere may deposit harmful materials and it is important to assess the potential impact of this. Objective - analyze archived meteorological data of winds, ozone and temperature, 30 to 60 km, and derive eddy diffusion coefficients and ozone flux values. How work contributes - this work will provide improved eddy diffusion coefficients and ozone flux values required for environmental model verification and evaluate lifetime of pollution in the stratosphere.

The statistics of observed winds obtained from rocket soundings are used to estimate eddy diffusion coefficients. Horizontal diffusivity can be estimated from variance of the meridional wind and its integral time scale. Vertical diffusivity is estimated from the wavelengths of the small scale disturbances observed in the mean wind profile. The ozone transient eddy flux values required for model verification will be obtained from ozonesonda data correlated with the wind data. The mean flux can be computed directly from the ozone data.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0004, NAVY ENVIRONMENT - REMOTE SYNOPTIC MEASUREMENT OF SURFACE CIRCULATION

J.D. Isaacs, University of California, San Diego Campus, Inst. of Marine Resources, *P.O. Box 109, La Jolla, California* 92037 (DN775038; N00014-76-C-1103)

The objective of this research is to develop a method for the remote synoptic measurement of ocean surface circulation. The remote, near real-time measurement of surface currents would be a highly valuable contribution in the planning and execution of Navy/Marine Corps operations in coastal waters.

This method relies on wavelength measurements of two distinct trains of gravity waves as they propagate through regions where surface circulation is to be determined. The method proposed here is basically simple, as it utilizes only wavelength measurements of two wave trains. The wavelength data will be determined from vertical aerial photographs. The photographs will be analyzed by optical data processing techniques to obtain the wavelength information from the two separate wave-trains propagating simultaneously. The waves will be generated by two wave generators of controlled frequency. The experimental work will include model simulation in a small basin located outdoors to simulate real illumination conditions for photography, and surface circulation measurement in a lagoon of a known and simple circulation. The results of these experiments will be evaluated for their application to surface circulation detection and measurement in harbors and larger bodies of water, both those accessible to ground measurements and otherwise; and the utility of local wind or ships' waves for such analysis.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0005, REMOTE SENSING OF OCEAN PROPERTIES BY MEANS OF VISIBLE LIGHT

R.W. Austin, University of California, San Diego Campus, Scripps Institution of Oceanography, Visibility Laboratory, *P.O. Box 1529, La Jolla, California* 92038 (7-721; 04-6-158-44033 MOD. NO. 7)

OBJECTIVE: The reduction, analysis and interprepation of the oceanographic atomospheric and satellite data obtained during the November 1978 post-launch Coastal Zone Color Scanner (CZCS) Nimbus-G Experiment Team (NET) cruise and related work. This effort is a continuation and extension of the research conducted by the Visibility Laboratory over the last several decades, which in the last two years has been focused on the application of the Nimbus-G to ocean color.

APPROACH: Following the November 1978 post-launch CZCS/NET cruise, the Laboratory will be involved in planning and execution of two 'validation' cruises during February-

March 1979 in the Gulf of California and during May-June 1979 in the Gulf of Maine. These are critical cruises with respect to validation and utilization of the CZCS data to usefully determine ocean optical properties and related biological properties. As a consequence, the primary effort will be devoted to optimum execution of these cruises and the timely preliminary analysis of appropriate data.

CURRENT PLANS AND/OR PROGRESS: Progress under NOAA/NESS Grant No. 04-6-158-44033 to date includes: 1) The development and construction of ocenographic instrumentation for measuring the relevant optical properties of ocean waters; 2) the development and construction of shipboard instruments for determination of specific atmospheric properties (transmission and scattering); 3) the development and utilization (in conjunction with NESS and NET) of experimental techniques for performing surface validation experiments; 4) automatic computer techniques (including mathematical model development) for reduction and analysis of oceanic and atmospheric data; 5) the performance of oceanographic surface validations and development of relationships between biological parameters and oceanic optical properties; and 6) the development of techniques for atmospheric correction of ocean color measurements.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Environmental Satellite Service

5.0006, MW REMOTE SENSING HARD ROCK

D. Belsher, U.S. Dept. of Commerce, National Bureau of Standards, *325 S. Broadway, Boulder, Colorado* 80302 (2762421)

PROJECT OBJECTIVE: Development of microwave measurement equipment and measurement techniques to probe hard rock or coal to depths up to 100 feet.

PROJECT APPROACH: Develop focused polarized antennas for the frequency range 30 MHz to 2 GHz. Extend probing range to 100 feet through development of advanced measurement techniques, define and construct a portable, permissible non-ignition source and practical microwave instrument.

SUPPORTED BY U.S. Dept. of Commerce, National Bureau of Standards

5.0007, DESERT EROSION AND SAND MOVEMENT IN EGYPT

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It is here proposed to study the Western Desert of Egypt as a type locality of the North African desert environment. Emphasis is placed on desert color as a probable age indicator and on sand movement and landform development. Correlations will be made with data on other desert regions.

Objectives of the proposed research include: 1. Investigation of desert color to better understand color zoning and its relationship to dune reddening with time, and to formulate a relative age scheme for zones within the Western Desert. Use will be made of color photographs taken for this particular purpose by the Apollo-Soyuz mission. 2. Detailed analysis of regional desert erosion, sand distribution, grain movement, and dune shapes. Attention will be paid to desert landforms in the Oweinat Mountain region for analogue correlations with similar features on Mars.

The proposed study will entail both field work and photogeologic investigations. Geological field work will encompass collection of sand samples and documentation of observations in preselected localities. Laboratory investigations and photogeologic interpretations of available aerial photographs and Earth orbital images will support and supplement field observations.

The Principal Investigator at the Smithsonian Institution will direct and coordinate the photogeologic investigations. Other U. S. experts and specialists in the field of desert study will assist the Principal Investigator in interpreting Earth orbital imagery and inspecting field localities. The Co-Principal Investigator at Cairo's Ain Shams University will manage the funds and day-to-day progress of the scientific research project. He will also be responsible for the coordination of field work and laboratory investigations. He will be assisted by local experts in structural geology, geomorphology, and mineralogy petrology.

SUPPORTED BY Smithsonian Institution, Office of Fellowships & Grants

5.0008, OIL SPILL AGING TESTS

W.A. Hovis, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Environmental Satellite Service, Satellite Experiment Lab., *14th St. at Const. Ave. N.W., Washington, District of Columbia* 20233 (042 (NOAA/EAO NO.))

The goal of this investigation is to determine the optical spectra of a number of various crude oil samples as a function of aging under simulated ocean conditions. The results will be utilized in analysis of remotely sensed data from spacecraft for oil spill location and monitoring.

Samples of crude oil will be floated on the surface of the EPA OHMSETT tank in Leonardo, New Jersey, in specially constructed floats that contain the oil, but allow for evaporation and dissolution. The oil will also be agitated by waves produced in the tank. Optical signatures will be collected with a scanning monochromator from 0.4 to 2.4 micrometers and with a radiometer from 10.5 to 12.5 micrometers. Data will be collected for one week as the oil samples age.

The measured reflectances from the samples will then be used to determine how best to process data for oil spill observation from spacecraft or aircraft.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Environmental Satellite Service

5.0009, PREDICTABILITY OF SHORT-TERM CLIMATE FLUCTUATIONS

K.E. Trenberth, University of Illinois, Urbana Champaign Campus, Graduate School, *Urbana, Illinois* 61801 (ATM78-19318)

Globally distributed sea level pressure data are being analyzed in order to isolate two known potentially predictable modes of the atmospheric circulation with time scales of one to ten years. Both modes have been shown to be significant in spectra of sea level pressure data.

The first is the Quasi-Biennial Oscillation (QBO). It is a widespread phenomenon, found in records of meteorological and geophysical parameters world-wide, but no attempt has been made to compile the details of the globally coherent patterns of the QBO or fully assess its significance.

The second is the Southern Oscillation (SO), which has a well defined time-scale of about 3-6 years and is most prominent in tropical regions. It has been shown to be the primary global mode of the normalized monthly sea level pressure field (in the sense that it explains more variance than any other). However, the importance of the SO for high latitude regions remains to be determined.

Since the time scales of these two modes are well defined (viz. about 2 years and 3-6 years) filtering of time series combined with empirical orthogonal function analyses should enable the modes to be isolated in the sea level pressure field. Spectral and cross-spectral analysis techniques are being used to investigate interrelationships between different modes in the atmosphere. The time series describing each mode will then be used to determine their importance and contribution to other geophysical parameters and economically important factors such as crop yields.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0010, REMOTE SENSING OF CURRENTS (RSC)

W. Scherer, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Ocean Survey, Engineering Development Lab., *6001 Executive Blvd., Rockville, Maryland* 20852 (86221300)

OBJECTIVE: Verify the practicality of remote sensing of currents by demonstrating a single channel acoustic device. Develop and verify a body of theory describing the acoustic volume reverberation and Doppler shift mechanisms involved.

Generate functional engineering specifications with system limitations.

APPROACH: Design and develop a single-channel feasibility model that can be used to collect data for analysis and evaluation. Survey existing theoretical scattering models and develop new models where necessary to describe the volume scattering process as a function of environmental parameters. Verify a framework of models through experiment.

PROGRESS: Preliminary lab and field testing for single channel feasibility have been conducted. Data analyses and technical feasibility demonstrations are summarized in a working document entitled 'Remote Current Sensor Feasibility Demonstration, Summary Report.' Additional data sets were collected during 1978 and data analyses are in progress, as are theoretical model developments for identification of the scattering mechanism(s).

SUPPORTED BY U.S. Dept. of Commerce, National Ocean Survey, Engineering Development Lab.

5.0011, MAGNETIC INDICATORS OF SUBSTORM ACTIVITY

R.L. Carovillano, Boston College, Chestnut Hill Campus, School of Arts & Sciences, Dept. of Physics, *140 Commonwealth, Chestnut Hill, Massachusetts* 02167 (DF248270; F19628-77-C-0085)

AF function - operation of communication, detection, and navigation systems and satellite orbit prediction. Deficiency - severe geomagnetic disturbances produce extreme departures from the normal conditions in the ionosphere that degrade system performance and increase atmospheric drag on satellites. Objective - develop a method for identifying the onset and specifying the development of magnetospheric substorms utilizing measurements made by the Air Force Geophysics Laboratory ground-based magnetometer network. How research contriubtes - a method for real-time specification of the development of magnetospheric substorms is essential for geomagnetic activity forecasts. The forecasts will enable system operators to take appropriate measures to lessen the impact of magnetic disturbances on operational capability.

Specifying substorm activity with data from the Air Force Geophysics Laboratory magnetometer network involves efforts in three areas - development and evaluation of a suitable index, investigation of micropulsation activity as related to substorms, and extension of ionospheric current models to characterize the intensity and location of current systems producing mid-latitude magnetic variations. An index specifying substorm activity will be developed utilizing measurements made by the magnetometer network as the main data input. The quality of the index will be evaluated by comparing it with additional magnetic and auroral particle data from a number of observed substorms occuring at various universal times. Geomagnetic micropulsation activity in the period range 10-150 seconds will be investigated for possible correlations with interplanetary magnetic field conditions that generally result in substorm activity. Analytical models of global ionospheric currents will be improved by including experimentally determined ionospheric conductivities and extended to calculate the magnetic perturbations produced at the surface of the earth.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0012, DEVELOPMENT OF NONLINEAR INVERSION ALGORITHMS

A.S. Zachor, Honeywell Inc., Radiation Center, *2 Forbes Rd., Lexington, Massachusetts* 02173 (DF249800; F19628-77-C-0184)

AF function - remote sensing of atmospheric moisture environment. Deficiency - moisture information contained in DMSP satellite data is not currently utilized. Objective - to develop retrieval algorithm which will extract from the radiance data all possible information regarding atmospheric humidity structure. How research contributes - determines the capability of remote satellite sensing for mapping the atmospheric moisture environment.

Existing algorithms will be analyzed for inference efficacy. Computer code will be chosen and developed for application to Block 5D DMSP H-Package radiance data.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0013, STUDY OF ENERGY BALANCE AND PLASMA MOTIONS IN THE IONOSPHERE

A. Dalgarno, Smithsonian Institution, Astrophysical Observatory, *60 Garden St., Cambridge, Massachusetts* 02138 (DF581840; F19628-78-C-0047)

AF function - surveillance, communication, navigation, ionosphere and magnetosphere modelling. Deficiency - inadequate knowledge of energy balance and plasma motions in the ionosphere for the design of AF communication and navigation systems. Objective - development of theoretical and computational techniques for the calculation of quantities pertaining to the energy balance and plasma motions in the ionosphere including the effects of particle precipitation and electric fields. Satellite measurements shall serve as inputs to calculations and as a test of the validity of the theory. How research contributes -provides data and analysis essential for the design and maximum utilization of communications, guidance and surveillance systems such as the defense satellite communication system, AF SATCOM II, 414l. The work provides an understanding of the dynamical processes in the ionosphere.

Study theoretical and computational procedures for calculation of energy balance, plasma motions and electrical conductivities on a global basis.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0014, MEASUREMENT OF TIME DEPENDENT PARAMETERS OF STRATOSPHERIC TURBULENT LAYERS OVER LEVEL TERRAIN

R.E. Good, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF581150)

AF function - provide data to predict if there is a significant change in the environmental quality of the stratosphere as a result of flight of USAF aircraft and missiles. Deficiency - existing data on stratospheric transport is insufficient to accurately predict changes in stratospheric composition from small perturbations caused by aircraft and missile exhaust products. Objective - conduct and analyze balloon-borne observations of the characteristics of turbulence layers. How research contributes - measurements of the turbulence characteristics over level terrain, away from mountains will be compared to previous measurements over mountains. This data will then be used to derive representative mixing coefficients and stratospheric pollution residence times over the United States. This will result in more precise environmental impact assessment of AF flight operations.

A balloon platform is used to carry a corona turbulence sensor that measures the intensity and spectral characteristics of turbulence layers. The balloon will initially be allowed to rise to 90,000 ft. producing a vertical record of the location of turbulence layers. The balloon will then be forced to descend so to float in a turbulent layer for several hours to observe the time history of the turbulent layer. This will be repeated several times during the estimated ten hour mission. A total of four balloon flights are planned with launches from Watertown, S. Dakota. Two flights will be made in early March and two flights during the summer to cover the westerly and easterly flow conditions. Additional turbulence data will be obtained with piggyback experiments flown on the BAMM program. A gas tracer payload developed and tested under LDF funds will be refurbished for four flights to obtain turbulence transport data.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0015, POST BURNOUT THRUST AND OUTGASSING MEASUREMENTS FOR SOUNDING ROCKETS
E.F. McKenna, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF580680)

AF function - sounding rocket operations. Deficiency - degradation of scientific data due to interference from expended solid propellant sounding rocket motor. Objective - to determine the magnitude of low level post burnout thrust, outgassing and particulate contamination by spent solid propellant rocket motors. How research contributes - knowing the magnitude of the hot gas discharge, motor throttling devices or vehicle/payload separation systems could be developed that would allow clean payloads to fly on the normally less expensive solid propellant rocket motors.

A separable payload will be designed and flown on a solid propellant sounding rocket motor that will measure the post burnout combustion mass flow rate and resulting thrust, monitor the diffusion of motor outgassing, and observe and measure the relative motions of the two bodies.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0016, EQUATORIAL IONOSPHERIC IRREGULARITIES MEASUREMENTS
R.S. Narcisi, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF249350)

AF function - maintain command control capabilities for Air Force operations in naturally or nuclearly disturbed conditions. Opportunity - the wide band satellite permits propagation measurements during periods of equatorial scintillations. Objective - measure the distribution of ion species during periods of equatorial scintillations to determine the structure and development of small scale ionospheric irregularities. How research contributes - this effort will provide the first detailed measurements of ionospheric irregularities in conjunction with wideband satellite amplitude and phase measurements. From this, the physical causes of scintillations can be understood to then permit the determination of trans-ionospheric electromagnetic channels for defense communication and navigation systems.

Three rocket payloads were prepared for launch in conjunction with passes of the wideband satellite experiment. One was flown on a DNA-provided launch; although data were obtained, the vehicle failed to achieve the required altitude. The series was postponed, as a result, and the experiments are now planned for a May or August 1978 launch window. After the remaining two flights are completed, analysis and interpretation of the data will begin but completion of the final report is not expected until approximately one year following the experimental series.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0017, VARIATION OF THE SOLAR ULTRAVIOLET LUMINOSITY
S.P. Worden, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF582550)

AF function - communication, surveillance, detection, tracking. Opportunity - to determine factors which influence long range weather patterns and atmospheric conditions. Objective - to determine whether the sun varies its ultraviolet luminosity by more than .1 percent over the course of a year. How research contributes - changes in solar ultraviolet luminosity may be the major factor influencing long range weather patterns as well as upper atmospheric ionization conditions. If such changes can be observed and predicted Air Force long range prediction capabilities in these areas may be greatly increased.

Because there is no suitable comparison source against which to directly observe changes in the solar ultraviolet luminosity we will use sunlight reflected off objects in the outer solar system such as the moons of Saturn. These will be compared against stellar standards to determine variability. We will use the Cloudcroft, New Mexico 48-inch photometric telescope for this purpose. The National Science Foundation will operate this telescope for one year to do this study. We have chosen outer solar system objects both with atmospheres, such as Saturn's moon Titan, and without atmospheres, such as Saturn's moon Rhea. We feel we can obtain .1 percent accuracy in our measurements.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0018, FAST SOLUTION METHOD APPLIED TO AN NWP MODEL ON A SPHERE
S.Y. Yee, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF581330)

AF function - military operations involving Air Force vehicles used by strategic tactical and general purpose forces. Deficiency - such operations are adversely affected by deficiencies in specifying and predicting winds and weather because of inaccurate or inefficient methods used in solving numerical weather prediction (NWP) models. Objective - to develop accurate and efficient methods for solving the NWP model equations. How research contributes - research will improve the accuracy and timeliness of weather forecasts.

The technical problem is one of casting an NWP model in a global setting, removing the coordinate singularities of a Poisson-type equation at the poles and overcoming the computational instability problem of a hyperbolic equation near the polar caps. The approach is to formulate the model equations in spherical coordinates, take special care in dealing with the polar caps, and insure computational stability by the use of digital filtering.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0019, OBSERVATIONS OF SUBSURFACE EQUATORIAL JETS IN THE INDIAN OCEAN
J.R. Luyten, Woods Hole Oceanographic Institution, *Main St., Woods Hole, Massachusetts* 02543 (ATM7821491)

The central scientific objective of this research is the observation of the east-west scales of the near-surface equatorial jets in the Indian Ocean, including their fate in the presence of the African coast. To accomplish this objective, a field program will be undertaken to measure velocity, temperature and salinity profiles at approximately 18 sites, extending from 47 degrees E near the African coast, to 70 degrees E in the central part of the western Indian Ocean. This observational program is an integral part of the oceanographic component of the GARP regional subprogram, the Monsoon Experiment (MONEX), contributing to the overall scientific objective of observing and understanding the sources and the onset process of the Somali Current. The equatorial region plays an important role in theoretical models of the onset phenomenon, and the influx of mass and momentum from this region is an important element in any estimates of the budgets in the Somali Current.

The Indian Ocean is subject to strong meteorological forcing at the annual periods and longer. The winds are monsoonal, blowing in the western Indian Ocean from the southwest from May until September and from the northeast during the remainder of the year. There is a corresponding set of oceanographic phenomena which are presumably related dynamically to the monsoon winds. Hence, the Somali Current is intimately connected with the Indian monsoon and the scientific problem addressed here is a first step in understanding the detailed dynamics of that connection.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Atmospheric Sciences

5.0020, REMOTE SENSING TECHNIQUES TO OPTIMIZE THE RECLAMATION OF PRIME FARMLAND
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OBJECTIVE: Characterize soil and vegetation parameters on prime farmland and newly strip-mined prime farmland utilizing direct measuring and remote sensing techniques. Develop a

data base format for storage and retrieval of collected information. Provide information in format usable by reclamation authorities.

APPROACH: Study sites of prime farmland and newly mined prime farmland will be located at active mining areas in two different geographic locations of the state. Detailed soil descriptions and data will be obtained using soil borings to a depth of 6 feet on a 50 foot grid. Vegetation will be established on the mined study areas. Measurements and observations of vegetation will be made on the same grid locations. Aerial photography will be flown at selected time intervals during the growing season. The film will be scanned by film recorder and response measurements obtained on a grid system. Through a data base retrieval system (to be developed) correlations of remote sensing responses with soil and vegetation parameters will be demonstrated. Results will be provided to extension service personnel to be utilized in educational programs as well as work by Missouri Land Reclamation Commission.

SUPPORTED BY U.S. Dept. of Agriculture, Cooperative Research Office, Missouri

5.0021, NAVY ENVIRONMENT - GRAVITY MEASUREMENTS AT SEA AND LOCAL MARINE GRAVITY AND GEODETIC ANOMALIES

M. Talwani, Columbia University, Lamont Doherty Geological Observatory, *Palisades, New York* 10964 (DN475182; N00014-75-C-0210)

The accuracy of inertial navigation systems, which are used extensively by the Navy in ships, submarines, airplanes, and missiles, is limited by the extent of knowledge about the earth's gravity field and consequent deflections-of-the-vertical. In support of the Navy's extensive effort to expand this knowledge, this program is (1) providing gravity data over the world's oceans, (2) helping to provide basic understanding of gravity variations which is necessary for predicting deflections-of-the-vertical, and (3) determining the relationship between local gravity and geodetic anomalies.

Surface and satellite-derived gravity data will be analyzed to determine the geologic structure of the crust and upper mantle in the region of plate boundaries and marginal basins. Regional maps of 1 deg x 1 deg average gravity anomalies will be published. Detailed geoids constructed from surface gravity data and satellite data will be used to determine deflection-of-the-vertical at sea in regions of large deflections. Mathematical techniques will be developed to determine density inhomogeneities from geoid undulations.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0022, STUDIES OF THE EQUATORIAL IONOSPHERE AND ATMOSPHERE

D.T. Farley, Cornell University, Ithaca Campus, School of Engineering, Dept. of Electrical Engineering, *242 Carpenter Hall, Ithaca, New York* 14853 (ATM7812323)

This award funds a program of research leading to a better understanding of the basic physical processes controlling Earth's equatorial ionosphere and atmosphere. The program includes: studies of plasma turbulence in the equatorial electrojet and equatorial F region; measurement of winds and temperature variations in the E region; studies of electric field variations at the equator and how these are related to high latitude phenomena; and studies of radar scattering from the troposphere, stratosphere, and mesosphere.

The experimental work will be carried out at the Jicamarca Radio Observatory located near Lima, Peru. This radar is uniquely situated for equatorial studies; it is also currently the most powerful system in the world for scatter measurements of the upper stratosphere and lower mesosphere.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Atmospheric Sciences

5.0023, ASSESSMENT OF THE HYDROLOGIC EFFECTS OF STRIP MINING IN THE NEW RIVER BASIN OF TENNESSEE

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OBJECTIVE: The general objective is to determine the effect of coal mining on water quality, sediment production, and streamflow in the New River basin of Tennessee. Specific objectives are to derive land cover and physical parameters of the basin, assess temporal changes, characterize sub-basins and monitor select sub-basins to assess integrated effects on hydrology, and characterize spatial differences in water quality, suspended sediment, and bed-load transport for both short and long-term events.

APPROACH: The approach is to derive land cover data to characterize the basin and segment it into relatively homogeneous regions. Monitoring stations have been established at the outlet of each region and at the mouth of the total basin. Six small basins with different mining activity will be monitored for surface water, water quality and suspended sediment; three of these will have continuous sediment samplers and measurements of bed-load. These will be used to establish the range of quality and runoff parameters and to calibrate digital models of the runoff, water quality, and sediment load characteristics.

PROGRESS: LANDSAT imagery was used to characterize land cover in the basin into nine land cover categories covering the entire 382 sq. mi. basin. All water monitoring stations have been installed and are operational. Five of the stations have automatic pumping samplers and one has an automatic six parameter water quality sampler. Data has been acquired over a considerable range of hydrologic extremes including floods with a 35-year return frequency. Data acquisition will be maintained but emphasis in 1979 will be on reports.

SUPPORTED BY U.S. Environmental Protection Agency, Office of Energy Minerals & Industry

5.0024, INVESTIGATION OF THE CIRCULATION AND PRECIPITATION STRUCTURES OF SOUTH CHINA SEA DISTURBANCES DURING THE WINTER MONEX

J. Simpson, University of Virginia, School of Arts & Sciences, Dept. of Environmental Science, *Garrett Hall, Charlottesville, Virginia* 22903 (ATM78-00233)

The objective of this proposal is to study weather disturbances in the South China Sea as a part of the U.S. program under the Monsoon Experiment (MONEX), a regional subprogram of the Global Atmospheric Research Program (GARP). The principal platform for these studies will be the National Center for Atmospheric Research (NCAR) Electra Aircraft. MONEX is a study to increase our knowledge and understanding of the dynamics and thermodynamics of the atmosphere and ocean in monsoon regions of the world. The monsoon is an intense regional weather phenomenon, but is second only to the global general circulation of the atmosphere (the Hadley Circulation) in energy content and, therefore, affects weather and climate on a global scale.

Specific research goals are to investigate: 1) The relationship between growth, development and decay of South China Sea disturbances to the cold surges of the winter monsoon; 2) The small-scale structure of these disturbances, the organization of their clouds and precipitation; and 3) How the monsoon and the disturbances, down to the small-scale cloud structures, interact to control or modulate precipitation over the maritime continent of Malaysia.

These investigations contribute to two main MONEX objectives: 1) Improved precipitation forecasting for the Malay Peninsula, a vital problem owing to the heavy flooding often occurring in early winter; and 2) Documentation of the latent heat supply for the winter planetary (Hadley cell) circulations in the Asian Monsoon area.

A secondary objective of this research is to compare the dynamics, thermodynamics and structure of cloud and disturbance scale weather phenomena over the monsoon region with those over the GARP Atlantic Tropical Experiment (GATE)

area. The PI and her group were active participants in GATE which was carried out in 1974.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0025, NAVY ENVIRONMENT - STRATOSPHERIC CONSTITUENTS

D.J. Hofmann, University of Wyoming, School of Arts & Sciences, Dept. of Physics, *P.O. Box 3435, University Station, Laramie, Wyoming* 82070 (DN223089; N00014-76-C-0170)

The objective of this work is to provide funds to support an atmospheric electrical measurements workshop to be held at the University of Wyoming, Laramie, Wyoming during the summer of 1978. In addition to an exchange of technical information the workshop will conduct balloon-borne experiments offered by the participants in the area of the influence of aerosols on the electrical properties of the atmosphere.

The University of Wyoming desires an exchange of information relating to the influence of aerosols of the electrical properties of the atmosphere. A workshop is an excellent means to achieve this goal. Actual balloon-borne experiments will be conducted during the workshop to provide comparisons of similar instruments.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, PLATFORM MOTION REQUIREMENTS FOR INITIAL TRAINING OF AIR-TO-AIR COMBAT SKILLS

L.D. Pohlman, U.S. Dept. of Defense, Air Force, Human Resources Lab., *Williams Air Force Base, Chandler, Arizona* 85224 (DF223230)

To determine the effectiveness of platform motion for the initial training of F4 air-to-air combat skills and to determine whether the onset cues provided by the synergistic six-post system on the simulator for air-to-air combat (SAAC) transfer of skills to performance in the aircraft.

The incremental training value of simulator platform motion will be determined through the application of a transfer of training paradigm. In the event that onset motion cuing has an incremental transfer effect, students training using platform motion should perform significantly better in the airplane than students trained without platform motion. To make this assessment, three groups are required: (1) students trained in the simulator who receive onset cuing provided by platform motion, (2) students trained in the simulator who do not receive onset platform motion cuing, and (3) students who do not receive any simulator training. The third group is necessary to establish that transfer from the simulator to the aircraft has occurred. The research effort will include the following tasks: (a) selection of air combat maneuvers where motion cues could play a vital role and the development of performance measures for those chosen, (b) development of a syllabus for training these fighter maneuvers, (c) evaluation of the effects of platform motion in terms of transfer of training to the aircraft using student pilots, and (d) evaluation of the effectiveness of the training provided.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0002, USMC AIR NAVIGATION TRAINING

O.A. Larson, U.S. Dept. of Defense, Navy, Personnel Research & Development Center, *San Diego, California* 92152 (DN797567)

To develop a program for training Marine Corps helicopter pilots in techniques that will allow them to fly over unfamiliar terrains under a wide variety of environmental conditions.

Map interpretation and terrain analysis techniques will be developed and evaluated. Flight navigation problems specific to USMC operational requirements will be analyzed and recommendations made. Materials and methods will be field-tested.

SUPPORTED BY U.S. Dept. of Defense, Navy, Personnel Research & Development Center

6.0003, AN EVALUATION OF MALE AND FEMALE ANXIETY DURING SERE TRAINING

D.C. Gillman, U.S. Dept. of Defense, Air Force, Air Force Academy, Behavioral Science & Leadership Dept., *Colorado Springs, Colorado* 80840 (DF282270)

AF function - technology base. Deficiency - adequate information on the response of AF cadets to stress-inducing situations at the USAF Academy is not available. Objective - the purpose of this study is to examine several aspects of anxiety and stress in second-year cadets participating in survival, evasion, resistance, and escape (SERE) training. How work contributes - the results of this study will make it possible to determine the levels of anxiety present in male and female cadets and to compare these anxiety levels with national collegiate norms. Further, it will determine how stable trait anxiety is, how much anxiety, stress, depression, and fatigue SERE training creates in men and women, and how stressful the SERE experience is compared to a normal college environment.

This effort is a continuation of work begun during the summer of 1977. Approximately 450 cadets from the class of 1980 were administered a questionnaire comprised of the following instruments: the eight-state questionnaire, Institute of Personality and Ability Testing (IPAT), Champaign, Illinois, the Anxiety Scale Questionnaire, IPAT, the Stressful Situations Questionnaire, Hodges and Felling, 1976, and specially constructed items dealing specifically with SERE training. These same instruments, with slight modifications, will be administered to the class of 1981 before and after SERE training during the summer of 1978. This pre-test/post-test design will detect any change in anxiety levels caused by SERE, and will yield valuable information about male versus female response to physically and mentally stressful experiences.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Frank J. Seiler Research Lab.

6.0004, LONG TERM PULMONARY EFFECTS OF MILITARY AVIATION

N.R. MacIntyre, U.S. Dept. of Defense, Navy, Naval Aerospace Medical Research Lab., Medical Sciences Dept., *Pensacola, Florida* 32508 (DN477051)

This study is directed toward determining if repeated exposure to the high performance jet environment, including 100% oxygen usage over the course of a naval aviation career, produces any significant change in pulmonary functions.

The study was originally designed to test spirometric function of jet versus non-jet naval aviators. Significant differences are emerging. It is now appropriate to further evaluate these pilots using more sensitive and sophisticated techniques. Additionally, the long term characteristics of the 35 year old 1000 aviator population offers a unique opportunity to study the natural history of pulmonary function in various aviator subgroups.

SUPPORTED BY U.S. Dept. of Defense, Naval Medical Research & Development Command, National Naval Medical Center

6.0005, DEVELOP NOISE-CHECK TECHNOLOGY FOR MONITORING AIRCRAFT NOISE

P. Rentz, Bolt Beranek & Newman Inc., *50 Moulton St., Cambridge, Massachusetts* 02138 (DF322710; F33615-77-C-0514)

A vital part of Air Force environmental noise planning efforts is the need to perform spot-check noise measurements which provide data supporting predicted noise exposure values and the corresponding decisions made regarding land use compatibility and environmental noise impact. The objective of this contract is to develop the aircraft noise monitoring technology needed by Air Force personnel to collect field measureed noise exposure data acceptable as evidence in cases involving extreme controversy or litigation.

The contractor will review the present state-of-the-art in aircraft noise monitoring technology. He will develop specific

procedures and instrumentation requirements for use by Air Force personnel in collecting noise exposure data able to withstand the closest technical scrutiny. The contractor will demonstrate the adequacy of the proposed AF noise-check methodology by performing an actual field application study at an AF airbase. Refinements in noise-check will be made after analysis of the data from the field application study.

SUPPORTED BY U.S. Dept. of Defense, Air Force,
Aerospace Medical Research Lab.

6.0006, CONCEPTUAL DESIGN AND MODIFICATION OF HUMAN IMPACT RESEARCH FACILITIES

J.A. Brown, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321460)

The success of research to define human exposure limits to emergency escape and aircraft crash environments and the development of design and evaluation criteria for personnel protective equipment in these environments is dependent upon the availability of adequate impact test facilities and equipment. The facilities must be capable of producing and measuring the complex acceleration-time histories that are experienced in USAF operations. Furthermore, they must be designed to meet the unique safety requirements associated with the use of volunteer subjects. The objective of this effort is to plan, design and/or modify impact test facilities and test fixtures required by experimental designs to meet USAF technology needs and operational safety requirements.

The capabilities of existing facilities and test equipment are assessed by test and analysis. Requirements for future research programs are studied to determine if these requirements can be met by existing equipment or by modification of this equipment. If new designs are required to meet the requirements, the design is developed through the conceptual phase and procurement specifications and plans are prepared and implemented. Operational performance capabilities and reliability of new and existing facilities are documented for review by laboratory engineering safety and human use committees. New instrumentation and data processing techniques are continuously investigated to improve measures of biodynamic responses and overall measurement accuracy.

SUPPORTED BY U.S. Dept. of Defense, Air Force,
Aerospace Medical Research Lab.

6.0007, COMPUTER AIDED HUMAN ENGINEERING DESIGN

J.W. McDaniel, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF320930)

The objective of this work unit is to develop a computerized technique which will accomplish major elements of the design of man-machine crew stations. The products will be detailed, integrated design requirements to be utilized by those activities that procure crew stations and the capability to provide either crew station design alternative or evaluation of existing designs. The work unit will also provide realistic modeling techniques for evaluating man's performance capabilities in hazardous environments in order to reduce the risks associated with experimenting with human subjects. This effort is coordinated with cognizant U.S. Navy and NASA personnel in regard to both overall objectives and technical approaches.

Computer-aided design and evaluation techniques will be developed which translate the human engineering data statistical bases into functional standards for crew station design and evaluation. Computerized interactive graphics techniques will be employed to minimize the time required to (1) design crew stations and (2) analyze that or other designs. The computerized biomechanical man-model (COMBIMAN) program will display to the user a man-model of variable proportion capable of simulating the physical characteristics of crew members in a true 3-D crew station. During FY 77, the COMBIMAN link and enfleshment equations will be validated against actual subject data including clothing and protective equipment variables. By the end of 1978, the model will be able to simulate the characteristics of AF women in the workplace. The human engineering computer-aided design (HECAD) program will allow the user to perform complex task analyses on candidate control/display configurations. The times required to reach, operate, and attend to various types of controls/displays can be rapidly determined on an interactive graphic type display. During 1977, human performance data on operation of standard cockpit components will be incorporated in HECAD.

SUPPORTED BY U.S. Dept. of Defense, Air Force,
Aerospace Medical Research Lab.

6.0008, SCREENING TECHNIQUES

R.D. Odonnell, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321080)

To develop a graded screening procedure for potential visual countermeasures which will allow increasingly more refined decisions concerning the effectiveness of the countermeasure against anticipated threats. The enormous costs of high fidelity and field simulation requires that only proposed countermeasures with a high probability of success be tested in these modes. The ultimate purpose is to add a low-cost series of screening procedures to a systematic evaluation sequence in order to allow larger numbers of countermeasure ideas to be tested, and to cost-effectively evaluate those with the highest probability of success. Supports AFSC development goals SO-5, TC-5, and TC-8.

Traditional and novel measurement techniques will be explored for potential utility in evaluation of countermeasures concepts. Such techniques include classical psychophysical measures, standard laboratory performance metrics, as well as standard and novel psychophysiological evaluations (e.g., visually-evoked responses, eye movement analysis, etc.). In addition, a generalized tracking task containing the highest level of fidelity consistent with a broad range of operator input requirements will be developed under a separate work unit. This tracking task, and other promising measurement techniques developed in the laboratory will be validated against high fidelity simulation and field tests, and will be sufficiently standardized to become part of assessment battery for potential countermeasures concepts. Integration of these screening procedures with higher fidelity evaluations will provide a systematized process which will allow maximally cost-effective decisions concerning the development of each countermeasure.

SUPPORTED BY U.S. Dept. of Defense, Air Force,
Aerospace Medical Research Lab.

6.0009, EFFECTS OF LONG DURATION NOISE EXPOSURE ON HUMAN AUDITORY PROCESSES

M.R. Stephenson, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321290)

Noise exposure standards for durations of 16 hours and greater as experienced during long missions and duty assignments are tentative and require additional knowledge to finalize criteria. Research carried out under this work unit shall attempt to identify and measure changes in human auditory processes effected by noise exposure durations of greater than 16 hours. These efforts will provide part of data base necessary to validate and/or revise existing tentative hearing damage risk criteria and establish firm criteria and standards. This work is being coordinated with the Environmental Protection Agency, and is being partially funded by EPA under Interagency Agreement Number EPA-IAG-D6-0356.

The approach will be to measure safe temporary hearing losses induced in human subjects by long duration low level acoustic exposures and to analyze the hearing recovery curves as additional indicators of risk. Human subjects will be exposed to broadband noise with exposure durations of between 24 and 48 hours. Groups of subjects will experience systematic variations of such acoustic parameters as the intensity, duration, and duty cycle of the test stimulus. Effects of the stimuli will be identified by monitoring the subjects' audiometric thresholds at specific time intervals.

SUPPORTED BY U.S. Dept. of Defense, Air Force,
Aerospace Medical Research Lab.

6.0010, SUBJECTS FOR HUMAN FACTORS APPLIED RESEARCH

W.J. Hovey, University of Dayton, Graduate School, *300 College Park Ave., Dayton, Ohio* 45469 (DF318360; F33615-76-C-0524)

The primary purpose of this contract is to procure the services of student volunteers to serve as experimental subjects in experiments conducted by and for the Human Engineering Division of the 6570 Aerospace Medical Research Laboratory for human factors applied research. The secondary purpose is to procure professional-technical effort associated with requirements herein specified.

This effort will be involved in experiments to determine human performance capabilities and limitations as they relate to the design of Air Force equipment and systems and to establish design principles and criteria for optimum utilization of human performance capabilities. For example, university students will serve as subjects to determine operator capabilities for controlling remotely piloted vehicles, head switching comparison, voice recognition, joystick evaluation, validation of COMBIMAN, anthropometry of design eye position, test and evaluation of special purpose photo-grammetric system, HUD symbology criteria, windscreen visibility, etc. These experiments will be conducted at the Human Engineering Divison facilities at Wright-Patterson Air Force Base. Screening and pretesting of subjects will be done by the contractor at the contractor's facility.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0011, DATA REDUCTION AND BIODYNAMIC MODELING

D. Leet, University of Dayton, Graduate School, *300 College Park Ave., Dayton, Ohio* 45469 (DF323720; F33615-78-C-0504)

The constant trend toward the design and development of faster and more mobile aerospace systems requires an increasingly greater understanding of man's interaction with and tolerance to the physical environmental demands of such systems. The present program is for the purpose of quantitatively defining given biodynamic environments, determining the physical and physiological properties and responses of the human body with respect to vibration, blast and impact force environments encountered in high-performance aerodynamic operation and during emergency procedures, providing necessary data in proper format for formulating injury criteria and tolerance limits and developing mathematical and computer models to describe complex biological functions.

This program will include the development of experimental biodynamic data reduction techniques, formulation of new and modification of existing computer programs for the simulation of human body dynamics, the generation of quantitative definitions for injury criteria based on such body models, analytic investigations of body tissue properties and development of mathematical methods applicable to the study of biological systems.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0012, CARDIAC CHANGES DURING EXERCISE CONDITIONING AND ACCELERATION

H.L. Stone, University of Oklahoma, Norman Campus, Graduate School, *660 Parrington Oval, Room 101, Norman, Oklahoma* 73069 (DF050410; AFOSR-78-3506)

AF function - aircrew personnel operating high performance aircraft are exposed to increasing levels of rapid onset, sustained, repetitive maneuvering forces. It has been recognized that cardiovascular responses can be encountered which may be particularly important in determining performance and severely limit or restrict the capabilities of the aircrew. Deficiency - with the development and deployment of high performance aircraft, flight personnel may be exposed to sustained periods of acceleration stress. Sustained plus Gz acceleration has been shown to produce marked changes in human cardiac performance characterized by various arrhythmias and ECG abnormalities. These responses have been interpreted as suggesting possible hypoxic or ischemic insult to the myocardium. The miniature swine has been proposed as an animal model having similar cardiac anatomy to that of humans and, for this reason, has been used in experimental studies designed to determine the effects of acceleration stress on the heart. Objective -the overall goal of the proposed work is to define the cardiac responses of miniature swine to the high sustained plus Gz acceleration levels which will be encountered by man in high performance aircraft during combat maneuvers. The major thrust of the current research is to identify the factor or factors leading to the cardiac responses previously observed in acceleration-stressed miniature swine. More specifically, the relative contributions of physiological factors (sympathetic nervous system) and/or mechanical stresses associated with plus Gz acceleration will be determined. How research contributes - the research is in direct support of RO 1.6, 'habital crew environments in AF operations' and supplements ongoing projects at AMD.

After exercise conditioning and left stellate ganglionectomy, acceleration will be imposed to determine whether those responses previously observed in acceleration-stressed swine can be prevented or reduced in magnitude. Cardiac responses will be evaluated on the basis of physiological, biochemical, and histological changes. The measurement of cardiac function, indices of myocardial metabolism, coronary blood flow, and serum enzyme levels will provide information regarding the physiological status of the myocardium during acceleration stress. Long-term effects of repeated exposure to high sustained TS made in cardiac tissue will be studied.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

6.0013, MASS DISTRIBUTION CHARACTERISTICS OF LIVING HUMAN BEINGS

R.E. Herron, Baylor College of Medicine, School of Medicine, *1200 Moursund Ave., Houston, Texas* 77025 (DF320390; F33615-76-C-0529)

The goal of this effort is to describe the variability of mass distribution characteristics of Air Force men for providing design criteria for analogues of the human body. These analogues are used to assess man's reactions to hazardous environments, e.g., impact, ejection, and to evaluate systems to protect man against such environments.

Stereophotographs will be made of a sample of 30 males selected to represent the body-size distribution of the Air Force population. From the stereophotographs, the weight, volume, location of the center of mass, and moments of inertia about the principal axes of inertia of the body and its major segments will be assessed. The relationships between these parameters and the anthropometry of the subjects will be established from which population statements will be formulated to serve as design criteria for human analogues.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0014, DEVELOPMENT OF IMPROVED METHODS FOR PREDICTING INVOLUNTARY SEPARATION

C.D. Gott, U.S. Dept. of Defense, Air Force, Human Resources Lab., *Brooks Air Force Base, San Antonio, Texas* 78235 (DF233340)

To develop improved mathematical/statistical methods for predicting involuntary separation within the Air Force enlisted force and other success/failure criteria such as graduation/elimination from undergraduate pilot training (UPT), technical training, and basic military training (BMT). Generalize the resulting mathematical prediction system to improve predictability in other areas of the personnel system. Compare and evaluate the predictability of the motivational attrition prediction (MAP) model with other existing and/or newly developed prediction systems.

The MAP prediction model will be implemented and tested on AFHRL's UNIVAC 1108 computer system. The original data base used by AFMPC/DPMYAA in developing MAP will be used by AFHRL to assure error-free implementation by duplicating the original study for which MAP was developed. Other already operational prediction systems and/or modified and improved new systems will be implemented and tested. For comparison purposes, the data base of approximately 15,000 recruits entering the Air Force in 1972 will be used. For this data base, the necessary predictor variables, such as history opinion

inventory (HOI), aptitude scores, high school courses, demographic information, and attrition criterion data are already available. The final optimum prediction model will be used to generalize to prediction of other success/failure-type binary and/or categorical criteria. Milestones--Dec. 77, implementation of MAP on U1100 computer system. Mar. 78, reanalysis of 1972 AF accession data using MAP and other existing and/or modified prediction systems to arrive at the system with the optimum predictability. June 78, technical report comparison of multiple linear regression and MAP for prediction of involuntary separation. April 79, completion of systematic study to generalize to prediction of other success/failure criteria. Dec. 79, technical report.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0015, MULTIPLE RISK FUNCTIONS FOR AIR FORCE PERSONNEL

R.A. Albanese, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF321780)

Coronary artery disease (CAD) is a major cause of ineffective time and disability retirement in the Air Force, and has been implicated in aircraft accidents. Thus early diagnosis and prevention of CAD in aircrew members is of importance to the Air Force. Several clinical factors (serum cholesterol levels, blood pressure, EKG changes etc.) are known to be associated with an increased risk of CAD in human subjects. This work unit focuses on the development of mathematical equations which numerically relate clinical risk factors to the occurrence of CAD in flying personnel such that these equations can actually be used in early disease diagnosis and prevention at significant costs savings to the Air Force.

The first step will be a computer implementation of the Walker-Duncan algorithm for fitting the multiple logistic risk function. This function, when properly fitted to Air Force data, will numerically indicate the presence of CAD and/or the potential to develop CAD in flying personnel as a function of available clinical risk factors. The Walker-Duncan algorithm must then be compared with discriminant analysis techniques for fitting the multiple logistic risk function. The clinical factors entering the risk function as predictors of disease will be freed of confounding side-conditions, including seasonal effects, and daily rhythms, using multivariate statistical techniques. To refine the diagnosis of CAD, statistical analyses of x-ray views of the heart vessels (coronary cineangiograms) will be accomplished to improve the delineation of disease severity. This work was formerly a part of project 6319 and was documented under work unit 02-10.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0016, BIOMEDICAL CRITERIA FOR ADVANCED RESPIRATORY LIFE SUPPORT SYSTEMS

F.W. Baumgardner, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF322500)

The performance of aircrew breathing systems must insure adequate physiological function to users in diverse operational environments. In dynamic operation current inventory regulators waste oxygen, exhibit flow limitations, and impose physiologically stressful breathing pressures on the cardiopulmonary system of the user. The primary objective of this work unit is to establish concepts and data for the development of systems which optimize oxygen delivery to aircrew of advanced and conceptual aircraft. Additionally, individual ventilation requirements under various flight profiles and levels of physiologic stress will be assessed with reference to current equipment as well as the development of new generation oxygen delivery systems. These efforts are coordinated with ASD/AEL on a continual basis in accordance with letters of agreement and with ASD/ENECE in accordance with TN-ASD-AMD/SAM-0103-77-61. Close technical liaison is maintained with Oklahoma City ALC, ASD/ENESS, NADC and USAARL. Previous accomplishments in this area are documented under work units 71641717 and 71641718.

Laboratory studies as well as informal reports from the operating commands have indicated that current military specifications for oxygen supply and the delivery equipment do not adequately meet man's respiratory requirements in high performance aircraft now being deployed. Efforts through FY 78 will be oriented toward providing ASD with standards for revising Mil-R-83178, specification for oxygen regulators, and Mil-V-27296, oxygen mask inhalation, exhalation valve. These efforts will include investigation of physiologic parameters such as instantaneous ventilatory flow, ventilatory pressure, tidal volume, respiratory frequency, inspiratory acceleration, minute ventilation and oxygen consumption. The physiologic effects of current inventory equipment such as hose length between oxygen regulator and mask will also be examined. Standards derived from physiologic studies will be reported to ASD/ENECE, in accordance with the requirements of TN-ASD-AMD/SAM-0103-77-61, and to ASD/ENESS for incorporation in appropriate AFSC design handbooks.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0017, BIOMEDICAL LIMITS FOR MOLECULAR SIEVE OXYGEN CONCENTRATOR SUBSYSTEMS

J.P. Cooke, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF322250)

The purpose of this work unit is to determine and define the biomedical limits of the molecular sieve oxygen concentrator subsystem. This effort is necessitated in view of the increased inert gas load in the body caused by the concurrent production of argon by the subsystem at levels 5-10 times that normally found in the atmosphere. This work unit is established to implement a new technology planning objective as directed by HQ Aerospace Medical Division.

A systematic analytical determination will be made at ground level and at various altitudes in order to define the inert gas loads in the body resulting from the wash-in of oxygen-argon mixtures and the wash-out of nitrogen. Particular attention will be addressed to conditions when the gas requirements (high workloads) placed on the subsystem are high, resulting in decreased oxygen concentration and a concomitant increase in nitrogen concentration along with a 5-10 percent argon concentration. The resulting data will be used to define the boundaries of the molecular-sieve subsystem where decompression will not be hazardous to crew members.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0018, USAF CENTRAL ECG LIBRARY

D. Hickman, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF322020)

Identify aircrew members having electrocardiographic abnormalities that are associated with potential risk in terms of sudden incapacitation/flying safety. Serve as a consultation service to the field in terms of interpretating and defining the significance of ECG findings, and the administrative aspects of the latter. Establish better criteria for the significance of specific electro-cardiographic abnormalities in terms of aircrew selection and retention.

The routine review of the electrocardiograms on aircrew members and the consultation aspects of the USAF Central ECG Library are those outlined in AFR 160-43 and AFR 160-17. Long-term followup studies of specific electrocardiographic abnormalities will be conducted using questionnaires and the results of the medical evaluations within the aeromedical consultation service. Methods for automating ECG interpretation, filing, and retrieval will be explored.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0019, FIREFIGHTER WORKLOAD FIELD STUDY-ANALYSIS BY TELEMETRY
L.G. Myhre, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF323480)

To use the field study approach to realistically evaluate the physiological stresses imposed on USAF firefighters during simulated firefighting operations. Aircraft related firefighting tasks are unique to military and other aviation related organizations, and there is a need to objectively determine the physiological requirements of these tasks to facilitate the evaluation and development of appropriate life support equipment. Specific objectives of this effort are to determine the workloads associated with various USAF firefighting tasks and to use the data thus obtained for the purpose of evaluating the adequacy of current and future self-contained breathing devices. In addition, USAF firefighting activity may be classified according to the observed work stresses; such a classification may be useful in the appropriate assignment of personnel.

USAFSAM scientists will travel to nearby ALC, TAC, and SAC bases where they will monitor (via telemetry) EKG and body temperature responses to simulated firefighting activities. These data may be used to estimate the energy requirements of USAF firefighters performing selected firefighting tasks, and, thereby serve as a means for evaluating existing self-contained respirators and/or firefighters' protective clothing.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0020, DEVELOPMENT OF AN ADVANCED DESIGN ANTI-G SUIT
R.M. Shaffstall, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF319880)

Develop anti-g suit design concepts to be used in the research and development of advanced anti-g suits. Experimental anti-g suits will be developed to determine advanced suit design which will offer improved g-protection. Anti-g suit design specifications will result from this effort which will terminate with a technology transfer to ASD/AEL.

Various anti-g suit design concepts will be evaluated on the SAM and NADC centrifuges with physiologic criteria of g-protection using experimental subjects. Design concepts to be considered include bladder sizes, capstans, inflation profiles, and the use of anti-exposure garments. The anti-g suit design which offers the greatest g protection with subject comfort will be integrated with the advanced anti-g valve (work unit 7930-12-06) for the fabrication of an advanced g-suit/valve system (work unit 7930-12-xx). Specifications of this advanced anti-g system will be transferred to ASD/AEL for incorporation into aircrew systems of high performance aircraft. Physiological evaluations of blood pressure and blood flow gradients in relation to anti-g suit abdominal pressure will be studied in experimental animals. This data will assist in the determination of optimal anti-g suit bladder pressures.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0021, GLAUCOMA
T.J. Tredici, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF323020)

Glaucoma has long been recognized as an important cause of ophthalmologic morbidity and removal from flying status in USAF aircrew personnel. A concerted effort is made at base level to identify affected aircrew personnel early, based on elevated intraocular pressure. This is most practically performed by using the Schiotz tonometer. The use of this instrument is taught to all flight surgeons during their course of instruction at USAFSAM. Further, the use of tonometer as part of the base level follow-up program is the most important part of the USAF policy on glaucoma. The objective of this work unit is to evaluate criteria for diagnosis, to delineate factors or characteristics which identify the point in the disease process when therapy should be instituted, to evaluate therapeutic modalities for both efficacy of treatment in absence of visual side effects which would contraindicate the performance of further flying duties, and where possible, to identify factors which causally relate progression of the disease.

The approach will involve careful and detailed ophthalmologic evaluation of each individual patient, with both follow-up interval and decision to commence therapy to be determined on an individual basis. The extensive and changing knowledge in literature in this field, both military and civilian sources, will be utilized as well as the accumulated expertise of the Ophthalmology Branch, Clinical Sciences Division, in follow-up and treatment of this disorder in aircrew personnel. The study will also include those patients with a diagnosis of glaucoma who are on therapy with epinephrine drops which is recognized as efficacious and accepted by the Surgeon General for chronic use while retaining flying status (AFR 160-12). Work under this unit was formerly conducted under 7755-09-05 and 7755-09-04.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0022, NEUROPSYCHOLOGICAL SEQUELAE AND PATTERNS OF DEFICIT IN USAF AIRCREW MEMBERS WITH CLOSED HEAD INJURY
R.D. Wheatley, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF324320)

To establish base rates and a collection of descriptive data regarding neuropsychological, and other psychometric, sequelae and patterns of deficit in USAF aircrew with closed head injury.

Compares the psychometric test performances of 50 closed-head-injured aircrew with those of 50 non-head-injured matched aircrew controls. Objective neuropsychological, intellectual, and personality measures are used. Inter-group as well as intro-individual comparisons will be carried out so that inferences derived from levels and patterns of performance can be developed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0023, THE EFFECT OF HIGH GZ FORCES ON SYMPATHETIC NERVOUS ACTIVITY
M.G. Ziegler, University of Texas, Medical Branch at Galveston, School of Medicine, Dept. of Pharmacology & Toxicology, *300 University Blvd., Galveston, Texas* 77550 (DF052300; AFOSR-78-3601)

AF function - aircrew personnel operating high performance aircraft are exposed to increasing levels of rapid onset, sustained, repetitive maneuvering forces. It has been recognized that cardiovascular responses can be encountered which may be particularly important in determining performance and severely limit or restrict the capabilities of the aircrew. Deficiency - high performance combat aircraft are now capable of plus Gz forces in excess of those man can tolerate and still maintain consciousness. The primary physiologic means by which man tolerates plus Gz forces is through vasoconstriction and tachycardia regulated by sympathetic nervous activity. Recent animal studies indicate that high plus Gz forces may elicit sympathetic nervous activity so intense that it can cause cardiac lesions. Objective - the study is designed to measure the involvement of the sympathetic nervous system in man's response to high gravitational forces. Since norepinephrine is the neurotransmitter of the sympathetic nervous system, measurements of levels of plasma norepinephrine should provide a reliable index of sympathetic nervous activity. How research contributes - this research directly supports research and exploratory development on-going under Subarea 1.6, 'habitable crew environments in the Air Force operations' and ADM TP06, 'crew technology', respectively.

These experiments will determine the NE and DBH responses of men to stress and high plus Gz. The effect of duration and intensity of plus Gz on plasma NE will be measured and then some of these studies repeated with subjects wearing an anti-g-suit to see how effectively the suit decreases stress to the sympathetic nervous system. The M-1 maneuver is effective in increasing man's tolerance to high plus gz. Since muscular straining increases plasma NE, the M-1 maneuver may work partly through stimulation of sympathetic nervous activity. Plasma NE levels will be measured on subjects performing the

M-1 maneuver to determine how effective a stimulus this is to sympathetic nervous activity. The levels of NE elicited by plus Gz and the M-1 maneuver will be compared with those elicited by exhaustive exercise.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

6.0024, AERODYNAMIC FORCES EXERTED ON AN ARTICULATED HUMAN BODY SUBJECTED TO WIND-BLAST

D.J. Schneck, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Engineering Science & Mechanics, *Blacksburg, Virginia* 24061 (DF053540; AFOSR-78-3706)

AF function - the Air Force operational environment involves exposure to a wide variety of mechanical forces including flail and impact. These forces are of special significance in relation to the incidence of ejection from high performance aircraft where the probability of disabling injury is unacceptably high. Deficiency - this research will provide input data needed for an elaborate biomechanical computer model of the human body which has been developed to determine the stresses, strains and injury mechanisms due to windblast during ejection. Objective - development of the theory of windblast effects on the human body as initiated under USAF/ASEE summer faculty research program and a recent mini-grant effort, examine the contribution of flow separation to limb flail during ejection, provide data for wind tunnel tests and for the articulated total body model studies at AMRL. How research contributes - this research will contribute directly to subarea 1.8 'aircrew safety and effectiveness in mechanical force environments.'

The researcher will elucidate the contribution of flow separation to the factors which initiate limb-dislodgment forces during ejection. These data will provide input to the AMRL articulated total body model, which will analytically describe the dynamics of ejection. Specific attention shall be focused on elucidating the time-dependent characteristics of the limb-dislodging forces, and on extending the analysis to include the head/neck configuration.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

6.0025, ADVANCED INSTRUCTOR OPERATOR STATION DISPLAY EVALUATION TECHNIQUES

C. Elworth, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DF228130; F33615-77-C-0017)

Develop techniques for scientifically measuring and quantifying display effectiveness as it relates to the performance monitoring task of an instructor pilot during aircraft simulator operation. Recent and current AF specifications require or permit the use of CRT displays for providing performance relevant information to the instructor pilot. When a CRT is used, there are a great number of ways by which flight and performance data may be illustrated. Justification for choosing or developing one method over another is seldom if ever provided in terms of hard data due to the virtual non-existence of such data. This work will develop techniques for providing this data.

The contractor will review instructor pilot duties at the IOS and devise tasks which are sensitive to display techniques and formatting. Contractor will also devise measures to be applied to this task which can be used to quantify the effectiveness of various alternate displays used in conjunction with this task.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, NUMERICAL DYNAMIC ANALYSIS OF STRUCTURES BY THE FINITE DYNAMIC ELEMENT METHOD

K.K. Gupta, California Inst. of Technology, Graduate School, *1201 E. California Blvd., Pasadena, California* 91109 (DF046950; AFOSR-77-3276)

AF function - design of aerospace vehicles. Opportunity - the finite dynamic element method has been developed for efficient free vibration and dynamic response analysis of large and complex structures. Objective - the finite dynamic element method will be developed for the discretization of the continuum involving plane stress/strain, plate bending, shell and solid of revolution elements. How work contributes -more effective structure analysis techniques could develop from this work.

Using the concepts of the finite dynamic element method, six dynamic elements pertaining to various continuum will be developed and implemented in computer programs. Two eigenproblem solution procedures for the quadratic matrix equations will be studied and implemented. The free vibration analysis program will be extended to yield a dynamic response analysis capability. This will be achieved by the model superposition method.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0002, NUMERICAL STUDY OF THE FLOW IN A SIMULATED WING-FUSELAGE JUNCTURE

W.R. Briley, Scientific Research Associates Inc., *Glastonbury, Connecticut* 06033 (DN775273; N00014-77-C-0075)

The development of accurate numerical methods to describe the flow about aircraft and missiles is essential for their design and optimization. This research will study, within the framework of the incompressible Navier-Stokes equations, the structure of the flow field in the vicinity of the intersection of a wall (with its accompanying boundary layer) and a wind rounded leading edge.

The flow in the vicinity of an airplane wing-fuselage juncture is extremely complex because, in addition to being three-dimensional, it usually involves both separation and the formation of vortices. These vortices can have a pronounced effect on the wing characteristics. Because of the complicated nature of the flow, analysis is of limited value and experiments would be both time consuming and costly. The present investigation isolates the juncture region as an element of the entire flow field. Within this element the flow will be studied by an alternating direction implicit method within the framework of the Navier-Stokes equations--the only reliable description of the flow.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

7.0003, WAVES IN TURBULENT MEDIA AND RANDOM LINEAR HYPERBOLIC SYSTEMS 15452-M

P.L. Chow, Wayne State University, School of Liberal Arts, Dept. of Mathematics, *4841 Cass Ave., Detroit, Michigan* 48202 (DA0F9164; DAAG29-78-G-0042)

To study wave propagation in time-dependent random media with special stress on effects of turbulence on the statistical properties of wave parameters. Relevance - study of time-dependent wave propagation is of practical importance to radio and optical communications systems. Specifically, the proposed work may provide better quantitative tools for measuring wave propagation of radio waves in the ionosphere and pulsed laser beams through the atmosphere.

Develop asymptotic and approximate methods for random partial differential equations.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

7.0004, INVERSION OF ISOPARAMETRIC MAPPINGS AND APPLICATIONS OF COMPUTER GRAPHICS TO 3D FINITE ELEMENT ANALYSIS

C.A. Hall, University of Pittsburgh, School of Arts & Sciences, Dept. of Mathematics, *4200 5th Ave., Pittsburgh, Pennsylvania* 15260 (DF044020; F44620-76-C-0104)

AF function - the design of 3D structures for future aerospace vehicles. Deficiency - more effective and versatile analytical and computational methods are needed for the design of 3D structures. Objective - this research intends to develop computational techniques for solving structural design problems by the use of numerical analysis and computer graphics techniques. How work contributes - a computational and graphical presentation technique for analyzing complex 3D structures will be developed.

The research effort includes (1) extending to 3D isoparametric elements the type of characterization of bijectivity already developed for 2D, (2) investigating efficient means of computing and graphically representing the solution of stress distributions in a given plane of intersection, (3) searching for an efficient algorithm to numerically invert the 20 node isoparametric mapping, (4) studying strategies for deciding numerically if a given set of nodes will lead to an invertible isoparametric mapping, (5) studying strategies for detecting anomalies in geometric data by graphically interrogating the data base.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0005, NUMERICAL METHODS FOR COMPUTER SOLUTION OF ENGINEERING PROBLEMS

S.L. Parter, University of Wisconsin, Madison Campus, School of Natural Sciences, Dept. of Computer Science, *Agriculture Hall, Madison, Wisconsin* 53706 (DN823218; N00014-76-C-0341)

Improvements in the design of both ships and aircraft and a better understanding of the Navy environment depend on more accurate and more rapidly obtainable numerical solutions to differential equations used for description, prediction, and control of physical phenomena. Such phenomena include fluid and gas dynamics, certain chemical reactions, and electrodynamic phenomena. The objective of this task is to develop accurate and efficient methods for the computer solution of differential equations which recur continually throughout engineering applications, with particular emphasis on fluid mechanics.

Both analytical results and numerical methods will be derived for two point boundary value problems (and singular perturbations thereof), nonlinear elliptic equations, free boundary value problems, and functional ordinary differential equations. Such problems often exhibit very delicate, and even pathological, behavior. Thus, an analytic understanding of the problems is often a necessary prelude to the development of successful numerical techniques.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, FAR INFRARED SPECTROSCOPY

P.L. Richards, University of California, Berkeley Campus, Lawrence Berkeley Lab., *Berkeley, California* 94720

Improved infrared techniques are being used to do experiments in areas of fundamental and applied infrared physics where their impact is expected to be large. Programs in progress include measurements of the infrared radiation left over from the creation of the universe, measurements of the radiation from dust clouds in our galaxy, measurements of the infrared spectra of impurities in semiconductors, and measurements of the absorption spectra of the surface layers of liquids and solids. (ERDA-77-123)

SUPPORTED BY U.S. Dept. of Energy, Div. of Basic Energy Sciences

8.0002, ENERGY TRANSFER IN CHEMICALLY REACTING SYSTEMS AND IN SURFACE CHARACTERIZATION

D.O. Harris, University of California, Santa Barbara Campus, School of Letters & Science, Dept. of Physics, *Santa Barbara, California* 93106 (DF046710; AFOSR-77-3138)

AF function - increased capabilities in remote sensing, communication, and several other areas depend on developments in laser technology and surface characterization. Opportunity - chemical lasers indicate a high probability of fulfilling these needs through their properties of different wavelengths, high power, high operating efficiency and lower weight. Objective - perform detailed studies of optically pumped metal excimers including high resolution spectroscopy. Determine effects of well-characterized solid surface interfaces on chemical reactions and on excited states of small molecules.

Obtain improved molecular constants, radiative lifetimes and quenching cross-sections for electronically excited molecules including Ca2. Presently Ca2 is produced in a stainless steel heat-pipe oven which can reach temperatures as high as 1100 degrees C, corresponding to a calcium vapor pressure of about 10 torr. Using alumina (Al2O3) a new heat-pipe oven capable of reaching 1600 degrees C will be developed which will allow calcium vapor pressures to one atmosphere. The higher operating temperature also will allow the investigation of other molecules such as Cu2 which are unattainable at lower temperatures. Using laser photoluminescence and high resolution spectroscopy, other molecules such as Rb2, Ba2, Mg2 and Sr2 will be investigated as potential optically pumped lasers. An ultra-high vacuum system will be assembled and aluminum atom reactions will be investigated in rare gas matrices near aluminum and aluminum oxide surfaces.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0003, RADIATIVE COLLISIONS

J.L. Carlsten, University of Colorado, Boulder Campus, Joint Inst. for Lab. Astrophysics, *1200 University Ave., Boulder, Colorado* 80302 (DN675412; N00014-76-C-0611)

The technical objective of this work is to investigate new atomic and molecular interactions which ultimately may have application to the development of new laser sources and frequency standards for naval applications.

The approach is to study the interaction of intense light sources with atomic vapors in a collisional environment. In particular, both spontaneous and stimulated collision-induced fluorescence will be studied. The experimental technique uses a nitrogen pumped dye laser whose output is scattered by a metallic vapor in an oven in the presence of a buffer gas. This scattered light is spectrally resolved by a monochrometer and detected with a photomultiplier whose output is then fed into a boxcar averager and then to a chart recorder.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

8.0004, PRECISION SPECTROSCOPY OF EXCITED STATES OF ATOMIC HYDROGEN AND HELIUM, AND FUNDAMENTAL ATOMIC COLLISION STUDIES

V. Hughes, Yale University, Graduate School, Dept. of Physics, *206 Elm, New Haven, Connecticut* 06520 (PHY7684469A01)

Research in the spectroscopy of excited states of atomic hydrogen and helium, as well as in fundamental atomic collisions involving processes in three-body atomic systems, will include the following; 1. measurements of the fine structure in the P23 state and the magnetic moment in the S123 state of helium; 2. laboratory studies of the atomic regime believed to present in the ground state of light atoms at the surface of pulsars using transitions from the S2 metastable state of atomic hydrogen to very highly excited states (n approximately 100) in very strong magnetic fields (approximately 50 kG); 3. high precision determination of differential Lamb shifts and fine-structure separation in atomic hydrogen; 4. merged beams experiments on eV-energy electron-transfer collisions of protons with hydrogen atoms; 5. determination of spin-exchange effects in electron-hydrogen atomic collisions.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0005, OPTICAL AND ELECTRONIC PROPERTIES OF LUMINESCENT SEMICONDUCTORS, AMORPHOUS MATERIALS AND METASTABLE SOLIDS 13412-P

F.E. Williams, University of Delaware, School of Arts & Sciences, Dept. of Physics, *Newark, Delaware* 19711 (DA0W5576; DAAG29 76 G0098)

To produce new fundamental information on the electronic states of luminescent semiconductors, amorphous materials and metastable solids. The proposed work on secondary explosives is very much in line with the goals of the Explosives Division at Picatinny Arsenal. It is expected that the results will be very useful in finding improved methods for initiation of secondary explosives.

A combined theoretical and experimental investigation will be performed on the luminescent spectra of associates of charged dopants in III-V semiconductors and metastable solids, and spectral changes with applied field for monotonically graded III-V mixed semiconductors; previously developed analysis techniques will be extended to the study of amorphous metals and on metastable solids with emphasis on secondary explosives such as ammonium nitrate.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

8.0006, VACUUM UV RADIOMETRY

J.M. Bridges, U.S. Dept. of Commerce, National Bureau of Standards, *Washington, District of Columbia* 20228 (2320472)

PROJECT OBJECTIVE: To establish the capability for making absolute measurements of the radiant power of light sources in the untraviolet region from about 50 NM to about 300 NM and provide efficient, convenient and accurate calibration services to users.

PROJECT APPROACH: Well-defined plasma sources are developed and are optimized for reproducibility, convenience and accuracy. The wall-stabilized hydrogen arc serves as the primary standard of radiance. Deuterium lamps and the argon mini-arc, recently developed at NBS, have been established as convenient transfer standards of radiance over the range from 120NM to 350NM and are now also devloped as standards of irradince. An argon maxi-arc is currently developed as a calibrated high intensity source for solar simulation in the UV-B region. Radiance and irradiance calibrations are performed for high priority users on a cost basis.

PRIOR YEAR ACCOMPLISHMENTS: An unexpectedly large demand for argon mini-arc calibration services arose from the leading nat. fusion labs (Princeton Oak Ridge, Gulf Atomic) and space res. grps. (Goddard Space Flight Ctr, LASP, NRL). A total of 7 mini-arc calibrations were performed during FY 77 and 4 more were in progress.

SUPPORTED BY U.S. Dept. of Commerce, National Bureau of Standards

8.0007, ANALYSIS OF SATELLITE PARTICLE OBSERVATIONS AND COINCIDENT AURORAL-E IONIZATION

J.R. Sharber, Florida Inst. of Technology, School of Science & Engineering, Dept. of Physics, *Country Club Rd., Melbourne, Florida* 32901 (DF052490; AFOSR-78-3625)

AF function - AF communication, detection and surveillance systems utilize paths through the ionosphere and their propagation characteristics are determined and perturbed by the state and fluctuations of the electron content of the polar ionosphere. Deficiency - at present, a determination of the total electron content of the polar ionosphere as a function of time and location and a forecast of its changes cannot be obtained from a knowledge of the plasma sheet particle population. Objective - to determine a quantitative relationship between spectral parameters of the plasma sheet particle population and routinely measured parameters of auroral-E layer ionization. Contribution - successful completion of this project will permit the determination of the approximate shape and total energy content of plasma sheet particle spectra solely from ionospheric soundings.

Data from two flights of the AFGL Airborne Ionospheric Observatory will be coordinated with coincident measurements from ionospheric sounders at ground observatories and the satellites ISIS-2 and VELA. The data consists of (1) Alaskan chain flight, Dec. 11, 1971 - to analyze the qualitative and quantitative relationship between particle spectra incident on top of the atmosphere and E-layer height and total energy content, (2) VELA intersection flight, Jan. 1974 - to compare particle spectra in the plasma sheet, particle spectra just above the auroral atmosphere and E-layer height and energy content.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0008, HIGH-RESOLUTION SPECTROSCOPY

H.M. Crosswhite, U.S. Dept. of Energy, Argonne National Lab., *9700 S. Cass Ave., Argonne, Illinois* 60439 (54700-01; EE-03-01-02)

Through FY 1979 the main emphasis of our research in high-resolution spectroscopy will be on the following problems: (1) examination near the ionization threshold of energy levels of atomic uranium, plutonium and several lighter elements such as Ba, including transition probability determinations (Hook method) and quadratic Zeeman effects. Relations between energy level positions and transition rates are analyzed by the multichannel quantum defect theory. These experiments are closely related to the laser isotope separation program. (2) theoretical analysis of empirical energy levels of U, Np, Pu and Es atomic and singly-ionized spectra, emphasizing configuration-mixing modeling relating to isotope-shift analysis and development of a systematic model for prediction of the electronic and thermodynamic properties of heavy and superheavy materials and plasmas. (3) experimental and theoretical studies of actinide ions (U through Es) in crystals, developing a model of 5F electronic energies for use in atomic and solid-state energy level calculations. (4) fundamental problems of simple diatomic molecular systems such as H2, D2, T2, OH, OT, N2 and N2 relating to verification of ab initio calculation methods and energy-transfer phenomena in atmospheric species. The basic experimental work will continue to use the large spectrographic facilities in a conventional way, but there will be increasing use of laser techniques for special investigations.

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research

8.0009, CHEMICAL PHYSICS FOR INERTIAL CONFINEMENT FUSION BY HEAVY IONS

Y.K. Kim, U.S. Dept. of Energy, Argonne National Lab., *9700 S. Cass Ave., Argonne, Illinois* 60439 (ANL 56851; ERDA EE-03-01-03)

The purpose of this new program is to provide atomic and molecular collision data which are essential for feasibility and design studies for inertial confinement fusion by heavy ions. As is outlined in a report prepared by the ERDA Summer Study Group (Ref. 1, pp. 11-12), there are two unrelated types of collision cross-sections relevant to the ion-beam fusion scheme. The first and most urgent is the cross-section for charge transfer between heavy ions. This cross-section determines the lifetime of the ion beam in a storage ring, and therefore places constraints on the design of the accelerator from ion source to storage ring. The second type of cross-section needed is for ionizing collisions between the ion and background gases, particularly those in the storage ring. This information should enable one to estimate accurately requirements on the vacuum system.

SUPPORTED BY U.S. Dept. of Energy

8.0010, WEAPONRY - QUATERNARY SEMICONDUCTOR MATERIALS TO MEET MORE DEMANDING MILITARY SOLID STATE REQUIREMENTS

N. Holonyak, University of Illinois, Urbana Champaign Campus, School of Engineering, Dept. of Electrical Engineering, *207 Engineering Hall, Urbana, Illinois* 61801 (DN775124; N00014-77-C-0086)

This work seeks means of synthesizing high purity gallium indium arsenide phosphide semiconductor materials for improved performance of Navy and other military solid state microwave amplifiers and injection lasers.

Both liquid phase and vapor phase epitaxial growth techniques will be pursued to grow various mole fraction ratios of gallium indium arsenide phosphide at various band gap energies

and lattice matched to either GaAs or InP substrates. Materials grown and their interfaces will be characterized by photoluminescence, photoconductance, and Van der Pauw means.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

8.0011, THEORY OF THE RESPONSE OF MATERIALS TO ELECTROMAGNETIC RADIATION

M. Altarelli, University of Illinois, Urbana Champaign Campus, School of Liberal Arts & Sciences, Dept. of Physics, *Urbana, Illinois* 61801 (DMR7824155)

Research previously supported by DMR7622352.

Theoretical research on the electronic structure of materials will be carried out. A particular emphasis will be on phenomena connected with surfaces and interfaces. The aim of this research is a better understanding of the microscopic processes which occur when electromagnetic radiation is absorbed in a solid and its energy is tranferred to the electrons of the material. A better knowledge of these elementary processes should be of help in interpreting the results of optical and photoemission measurements and in extracting more information on the electronic structure of the investigated systems from such experiments. Emphasis will be given to semiconductor surfaces, in view of the present incomplete understanding of these technologically important systems.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0012, ENERGY TRANSFER IN ATOMIC AND MOLECULAR SYSTEMS

D.H. Winicur, University of Notre Dame, Radiation Lab., *Notre Dame, Indiana* 46556

Studies planned include the following: molecular beam methods to determine the mechanisms, cross-sections, and intermediate species involved in the transformation of energy from one form to another. Crossed beams to measure differential scattering of electronically excited metastable rare-gas atoms by various small molecules (e.g., H2O, CO2, HBr, C6H6, N2, Br2). Time-of-flight techniques to measure the velocities and the identities of the scattered species; detailed information on the cross-sections for energy transfer between atoms and molecules; identification of states formed immediately after the initial energy transfer; determination of the potential-energy curves for the interacting atoms and molecules. Examination of the magnitudes and velocity dependencies of the integral energy exchange cross-sections between excited argon and HBr or CO2 by examining quenching of the differential scattering at large angles; potential-energy curves for the electronically excited states of atom-molecule complexes to examine the qualitative differences between these and the ground-state curves; effects of the initial relative kinetic energy and of the electronic excitation energy of the atom on the transfer of energy to small molecules. (DOE/ER-0002)

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research

8.0013, ELASTIC LIGHT SCATTERING INVESTIGATION OF THE DEFECT SUBSTRUCTURE OF REFRACTORY OXIDES

W.P. Unruh, University of Kansas, Lawrence Campus, School of Liberal Arts & Sciences, Dept. of Physics & Astronomy, *112 Bailey Hall, Lawrence, Kansas* 66045 (DMR78-10824)

This research will be a coordinated light scattering investigation of the defect substructure of refractory oxides, with emphasis on magnesium oxide. The aggregation and phase separation of impurities, and their precipitation onto the internal substructure of crystals, will be probed nondestructively in high quality samples by means of three complementary elastic light scattering methods. The goal is to obtain fundamental information regarding the mobility, diffusion, nucleation and spatial distribution of phase-separated and aggregated impurities and defects in this important class of materials. Progressive changes in defect substructure will be followed as standard thermal sequences are applied to the materials. Because even trace impurities are inhomogeneously distributed, this substructure plays a dominant role in the transport, optical and mechanical properties of high quality transparent dielectric materials. This research will contribute to the fundamental understanding of the mechanisms which produce the highly inhomogeneous defect substructure in high quality refractories containing nominal impurity concentrations. It is expected that this knowledge will suggest ways in which inhomogeneities may be reduced or eliminated, a result which would significantly improve the technical applicability of these durable materials.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0014, LASER-PRODUCED PLASMAS AND RADIATION SOURCES

B. Lax, Massachusetts Inst. of Technology, School of Science, Dept. of Physics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF042150; F44620-76-C-0002)

AF function - operation of high altitudes vehicles in a post nuclear explosion environment, development of electromagnetic weapons, space and ionospheric communications as well as countermeasures demand the fundamental understanding of interactions between laser beams and plasmas in the presence of strong magnetic fields. Deficiency - the aforementioned information for the design of advanced equipment is not available today. Its acquisition may be realized by a well planned theoretical and experimental research program. Objective - this program will study the interaction of ionization waves and the effect of a strong magnetic field upon the backscattering of CO2 laser radiation from a laser produced plasma. Contribution - this work is a part of a comprehensive program of plasma research for the development of an x-ray radiation source for simulation of nuclear weapon effects, the development of advanced electromagnetic weapons (laser and particle beams), the development of space and ionospheric communications, and the development of countermeasures.

This project will investigate theoretically the following areas: a. Stimulated backscattering and nonlinear acoustic wave interactions with the electron cyclotron motion. A detailed and refined approach will be used to provide more diagnostic information on the laser induced plasma, b. Head-on collisions between laser-driven ionization fronts. The 300 Joule CO2 laser is powerful enough to heat sufficiently the plasma and produce unambiguous measurements of the electron temperature jump in the collision zone. The laser beam will be split in two parts and focused by identical Cassegrainian optical systems onto the ends of a gas target, c. Coherent nonlinear Raman scattering from plasmas. A theoretical investigation will be performed of the third order nonlinear susceptibility in a simple plasma in two cases, 1. without a magnetic field and 2. with a magnetic field. For simplicity a collisionless plasma will be considered. They will study the properties of the nonlinear susceptibility and the resonances at the ion acoustic wave frequency and at the electron plasma frequency. These theoretical results will be used to guide the experimental program. In this project they are in close contact and cooperation with Profs. Ong and Duderstadt of Michigan (grant AFOSR 76-2904) who are doing theoretical work in this general area.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0015, INVESTIGATION OF THICK REFLECTION HOLOGRAMS

B.J. Chang, Environmental Research Inst. of Michigan, *P.O. Box 8618, Ann Arbor, Michigan* 48107 (DF052120; F49620-78-C-0061)

AF function - future Air Force weapons systems will require the real-time processing of data obtained from a multitude of sensors at data rates which exceed current capabilities. The most promising solution at the present time is the use of the parallel processing capability of optics. Opportunity - optical processors currently require complex lenses which are heavy, bulky, and expensive. The proposed effort will investigate holographic optical elements (HOES) which offer advantages of a reduction in the mechanical stability problems of conventional

optical systems, a reduction in the number of optical elements, and a reduction in weight, size, and cost, all of which render these elements very applicable to the development of optical systems for aircraft and missiles. Objective - this research will formulate a theory that can adequately describe the behavior of thick reflection holograms. How work contributes - this effort advances optical processors for airborne and terminal guidance applications.

Various theoretical methods will be investigated that are capable of describing the behavior of practical thick reflection holograms having non-uniform, non-sinusoidal refractive index modulation. A computer program will be developed that will be capable of modeling reflection holograms using the theoretical technique that appears to be the most promising. This program would be compatible with the existing holographic optics analysis and design (HOAD) program.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0016, INELASTIC MOLECULAR COLLISIONS--APPLICATIONS OF THEORETICAL METHODS TO PROBLEMS IN RELAXATION PHENOMENA AND LASER OPERATION

R. Rabitz, Princeton University, School of Natural Sciences, Dept. of Chemistry, *Box 430, Princeton, New Jersey* 08540

Aspects of molecular collision phenomena; new theoretical methods capable of handling realistic collision problems; variationally based decomposition methods along with effective Hamiltonian-type techniques; vibrational relaxation of HF; rotational state participation in vibrational relaxation. Modeling of HF lasing under various experimental conditions. Analysis of key physical factors controlling various types of collision behavior; temperature and quantum number scaling of vibration-vibration exchange rates. Chemical reaction theory based on a combination of decomposition methods and special channel coupling techniques; multichannel reactive cross-sections. (DOE/ER-0002)

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research

8.0017, SPECTROSCOPIC STUDIES OF THE ELECTRONIC STRUCTURE OF SEMICONDUCTOR INTERFACES

D.E. Eastman, International Business Machines Corp., *P.O. Box 218, Yorktown Heights, New York* 10598 (DF042670; F44620-76-C-0041)

AF function - modern aerospace electronic systems for command, control and communications, and for surveillance and reconnaissance depend heavily upon solid state electronic and optical devices. Opportunity- future improvement in performance of these devices requires a thorough understanding of the electronic structure and excitations processes in selected solids. Objective - the objective of this research is to provide knowledge of the electronic structure, electronic transitions and interactions, and optical properties at semiconductor interfaces that are vital to microwave device operations. How work contributes - this work will provide knowledge and understanding of interface states that will permit the development of more reliable and efficient microwave devices for the above system.

The electronic structure and properties of III-V semiconductors, selected group IV, and ternary III-V alloy semiconductors and of semiconductor interfaces, including metal-semiconductor Schottky barriers will be studied by a variety of techniques including photoelectric yield and photoelectric spectroscopy using synchrotron radiation, and electron energy loss spectroscopy, auger electron spectroscopy and low energy electron diffraction.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0018, COMMUNICATIONS - CONDUCTIVITY AND OPTICAL EFFECTS IN ANISOTROPIC SEMICONDUCTORS

J.F. Schetzina, University of North Carolina, North Carolina State University, School of Liberal Arts, Dept. of Physics, *Raleigh, North Carolina* 27607 (DN223319; N00014-77-C-0470)

This work on the electrical transport and photovoltaic effect in semiconductors is applicable to the development and improvemewt of electronic devices, optical switching and electrical instrumentation used by the Navy in its communications operations.

Experimental observations of the photomagnetoelectric and anomalous photovoltaic effects in cadmium telleride films will be compared with theoretical predictions of a new model. This model is based on properties of a variably (with depth) anisotropic relaxation semiconductor. Optical absorption, x-ray diffraction, and x-ray fluorescence spectra will be obtained for well characterized films.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

8.0019, SURFACE-STRENGTHENING MECHANISMS IN REACTION-SINTERED SILICON NITRIDE AND MIXED MODE SUBCRITICAL CRACK GROWTH

M.G. Mendiratta, Systems Research Lab. Inc., *500 Woods Dr., Dayton, Ohio* 45432 (DF049810; F49620-77-C-0124)

AF function - ceramic turbine engines for remotely piloted vehicles (RPV) are being developed for greater cost savings and higher performance. Opportunity - the reaction-sintered method of forming silicon nitride (RSSN) offers an attractive opportunity for cost savings in manufacturing turbine components. Objective - the objective of this research is to understand and develop surface-strengthening mechanisms for RSSN. How work contributes - since brittle ceramic fracture frequently originates at surface flaws, especially RSSN, surface treatments are expected to significantly increase the useful design strengths of these materials.

The major emphasis will be placed on the systematic correlation of mechanisms of oxidation and mechanisms of strength improvement/degradation. Full characterization of the surface scale and its effect on the fracture-mechanics will be evaluated. Dense silicon nitride coatings on RSSN will also be evaluated.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0020, LABORATORY STUDIES OF ATOMIC COLLISION PROCESSES 14656-P

M.A. Biondi, University of Pittsburgh, School of Arts & Sciences, Dept. of Physics, *4200 5th Ave., Pittsburgh, Pennsylvania* 15260 (DA0F8927; DAAG29 77 G0079)

To acquire reaction rate data for porcesses of importance in laser plasmas and to elucidate the nature of the atomic collision processes occurring in plasmas of the type encountered in gas lasers and in the ionosphere. Relevance - the program is relevant to the design of high power closed cycle electric carbon dioxide lasers and the middle atmospheric research program of the Atmospheric Sciences Laboratory.

The magnitudes of the recombination coefficients of complex ions such as CO(plus)CO, CO(plus)H sub 2 O, Xe3(plus), etc. and the variation with electron temperature will be studied over a wide range. The nature of cluster ion recombination processes will be investigated by using optical spectrometric techniques to characterize the final states produced by the recombination events. A drift tube will be used to study both dimer and polar molecule cluster ions and non-resonant charge transfer processes.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

8.0021, EXPERIMENTAL STUDIES OF SUPERCONDUCTIVITY IN AMORPHOUS METALS

D.G. Naugle, Texas A & M University, College Station Campus, School of Science, Dept. of Physics, *College Station, Texas* 77843 (DMR7825003)

Research on amorphous superconductors initiated under NSF Grant No. DMR-7504364 will be continued and extended. Thermodynamic and electronic transport properties of superconducting amorphous transition metal alloys will be studied as functions of composition, magnetic field and temperature. These measurements will yield data on the electronic density of states at the Fermi level and the Debye temperature, two parameters which occupy a central position in the microscopic theory of the superconducting state. Amorphous foils will be fabricated via a hammer and anvil type 'splat-cooler' while amorphous films will be prepared by means of a high-vacuum code-position technique. Electron diffraction and X-ray techniques will be used to characterize the samples. In the later stages of this research superconductng tunneling techniques will be developed to obtain a direct measure of the superconducting energy gap and data relating to the phonon density of states. This work is important for our fundamental understanding of the microscopic interactions which give rise to the technologically important phenomenon of superconductivity.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation,
Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0022, BAND STRUCTURE OF SOLIDS AND POINT DEFECTS IN CRYSTALS

C.C. Lin, University of Wisconsin, Madison Campus, School of Letters & Science, Dept. of Physics, *500 Lincoln Dr., Madison, Wisconsin* 53706 (DMR7827575)

Research previously supported by DMR76-83684.

Theoretical research on the structure of solid surfaces and point defects in solids will be performed. The method of linear combinations of atomic orbitals (LCAO) has proved to be a useful and versatile tool for accurate calculations of electronic energy band structures of perfect crystals, amorphous silicon, and solid surfaces. The LCAO method not only produces accurate electronic energies and wave functions, but also provides a simple picture which enables us to correlate the properties of the solid with those of the constituent atoms. Theoretical studies of electronic structures of solids by the LCAO method will be continued. The specific topics of research can be divided into two broad categories: (1) studies of impurity atoms and associated vacancies in ionic crystals, including the excited states of the impurity atoms, distortion of the valence-band states of the host crystals, charge transfer transitions and other optical processes, (2) chemisorption of chlorine atoms on III-V compound semiconductor crystal surfaces with special reference to the (110) surface of GaAs and the surface states produced by adsorbate-substrate bonding. This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation,
Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0023, VIBRATIONAL SPECTROSCOPY AT HIGH PRESSURE

W.F. Sherman, University of London, Kings College, Dept. of Physics, *Strand, London, England, United Kingdom* (DA0C9456; DAERO 76 G0054)

Study on the lattice dynamics of crystals in a variety of systems as a function of pressure and temperature. Behavior near phase transitions is particularly important. New high pressure cells for use in Raman and infrared spectroscopy are to be designed and constructed. Such cells will not contain diamond anvils/windows and will attempt to extend the limit of pressure obtainable by less expensive materials. Such studies, techniques, and equipment have immediate application to a variety of current U.S. Army research interests in many areas including the fields of energetic materials and electronic materials. Additionally, a new and novel narrow bandwidth filter, tunable over frequencies from the IR to UV, is to be used in this effort. The concept of this filter is in the process of review for assistance in patenting by the U.S. Navy. It appears to represent orders of magnitude improvement in detection of low intensity lines, such as a Raman line, at frequencies very near a high intensity line, such as a laser line. Further development and improvement of this device holds significant potential for U.S. Army's programs in camouflage detection, chemical and pollution detection, and in most research efforts involving laser spectroscopy.

Infrared and Raman studies are to be carried out over wide ranges of pressure and temperature on a variety of crystalline materials. High pressure optical cells will be developed to extend where necessary the range of these experiments. The purpose of this work is to improve our understanding of intermolecular forces, molecular motion in solids, and the detailed mechanism of solid-solid phase changes.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Research & Standardization Group

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, RELATIVISTIC ASTROPHYSICS

J.E. Gunn, California Inst. of Technology, Graduate School, Dept. of Physics Mathematics & Astronomy, *1201 E. California Blvd., Pasadena, California* 91109 (AST7680801A02)

This proposal covers research in many different areas of astrophysics and relativity. The research will be primarily theoretical, but will also include some astronomical observations and some aspects of experimental relativity. The topics to be studied include: (a) the large-scale structure and cosmological evolution of the universe; (b) the origin, structure, and evolution of galaxies and clusters of galaxies; (c) the dynamics of globular clusters and the distribution of masses for the oldest stars in the universe; (d) late stages of stellar evolution and the structures of giant stars that have neutron stars or black holes in their cores; (e) close binary star systems and their roles as compact X-ray sources; (f) gravitational collapse and black holes; (g) the theory of the generation of gravitational waves and plans for a search for gravitational waves using Doppler tracking of interplanetary spacecraft; (h) design studies for new experiments to test general relativity theory.

This work is a continuation of work previously supported by NSF grant AST76-80801A01.

SUPPORTED BY U.S. National Science Foundation,
Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0002, SOLAR FLARES

H. Zirin, California Inst. of Technology, Graduate School, Dept. of Physics Mathematics & Astronomy, *1201 E. California Blvd., Pasadena, California* 91109 (DF248780; F19628-77-C-0106)

AF function - communications, surveillance, detection, tracking. Deficiency - inadequate warnings of sun-induced disruptions. Objective - determine the effect of chromospheric structures, motions and magnetic fields on the solar atmosphere and how each contributes to the environment for solar activity. How research contributes - provides the physical knowledge necessary for a sound cause-and-effect prediction technique for solar-induced disruptions.

Collaborative studies with the Sacramento Peak Observatory on the chromosphere to obtain maximum observational data on selected solar events.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

10.0003, THEORETICAL STUDIES OF THE STRUCTURE AND EVOLUTION AND CLOSE BINARY SYSTEMS

R.F. Webbink, University of Illinois, Urbana Champaign Campus, School of Liberal Arts & Sciences, Dept. of Astronomy, *Urbana, Illinois* 61801 (AST7812309)

Support is for theoretical research in the structure and evolution of close binary star systems. Continuing studies by the principal investigator address a broad range of topics involving binary stars: conditions of mass exchange between stars, and its effect on the evolution of both stars; the stability of many ob-

served binary systems, especially novae and dwarf novae, against rapid mass exchange; and the role of close binaries in the evolution of star clusters and galaxies. Since most stars are members of close binary systems, solutions to these problems contribute to the understanding of stellar and galactic evolution. Emphasis will be placed on studies of the stability, nature and origin of the cataclysmic variable stars, and the evolution of binary stars to the cataclysmic binary stage.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0004, THEORETICAL STUDIES OF MAGNETIC DEGENERATE STARS

G. Chanmugam, Louisiana State University, Agricultural & Mechanical College, School of Chemistry & Physics, Dept. of Physics & Astronomy, *University Station, Baton Rouge, Louisiana* 70803 (AST7606807A01)

This research will be concerned with studies of the effects of magnetic fields and rotation on the structure and stability of white dwarf stars. Studies of this type will be valuable in determining whether similar phenomena take place in neutron stars.

In the past few years astronomers have identified a particular class of binary stars known as AM herculis binaries. These binary systems have, as one of their members, a white dwarf star which possesses an extremely strong magnetic field. The light from these systems is strongly circularly polarized. The origin of this polarization is not fully understood. A study of the origin of the polarized radiation field will be made.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0005, COMETS

B. Marsden, Smithsonian Institution, Astrophysical Observatory, *60 Garden St., Cambridge, Massachusetts* 02138 (31P-4P50-07)

Work is being continued on several aspects of orbital problems on comets and minor planets. In particular, our studies pertain to the examination of the non-gravitational forces acting on comets and to the behavior of objects in orbit close to the 2:1 mean-motion resonance with Jupiter.

SUPPORTED BY Smithsonian Institution, Astrophysical Observatory

10.0006, HIGH-SPEED SPECTROGRAPHS

L. Mertz, Smithsonian Institution, Astrophysical Observatory, *60 Garden St., Cambridge, Massachusetts* 02138 (SRF-460123)

We propose to build two spectrographs of a novel design that provide extreme speed (f/0.9) with a sharp, stigmatic, flat, nonanamorphic field. The configuration is a concave diffraction grating with a hemispheric field lens and has become feasible only since the advent of holographically formed diffraction gratings because conventional ruling is limited to rather flat surfaces.

One spectrograph will serve for conventional applications, replacing Schmidt camera spectrographs. The other will have a special reticle in place of the entrance slit for development and testing of Fresnel convolution spectrography. The Fresnel convolution technique vastly augments the light acceptance without sacrificing resolving power and should be particularly beneficial to obtain spectra of faint diffuse sources such as nebulae and comets.

Both the Fresnel convolution technique and the spectrograph configuration are distinctly novel. Part of the reason for two spectrographs is that two hemispheres are fabricated from a single sphere, so that two are almost as inexpensive as one.

SUPPORTED BY Smithsonian Institution, Office of Fellowships & Grants

10.0007, MULTIPLE-MIRROR TELESCOPE (MMT)

F.L. Whipple, Smithsonian Institution, Astrophysical Observatory, *60 Garden St., Cambridge, Massachusetts* 02138 (310-4050-02)

In cooperation with the University of Arizona, SAO is building a large astronomical telescope of radical design for both optical and infrared applications. The telescope will utilize six 72-inch mirrors clustered around a central core structure. The light-gathering power of such an instrument would be the equivalent of a conventional 175-inch telescope. As of June, 1975, the site at SAO's Mt. Hopkins Station has been prepared and the plans for the building completed. The yoke that supports the telescope is approaching completion under contract with Philco-Ford Western Development Labs. The computer control system is also approaching completion at SAO. The design of the optical support structure is completed, under contract to Simpson, Gumpertz, and Heger, Inc. The figuring of the optical elements is in progress at the University of Arizona Optical Sciences Center, and the active optical alignment system is being designed and constructed at Steward Observatory, University of Arizona.

SUPPORTED BY Smithsonian Institution, Astrophysical Observatory

10.0008, RED GIANT STARS

J.M. Scalo, University of Texas, Austin Campus, School of Natural Sciences, Dept. of Astronomy, *200 W. 21st St., Austin, Texas* 78712 (AST7711883A01)

This research involves studies of red giant stars and will consist of the following projects: 1) There will be calculations of the predicted distribution of spectral types and luminosities of these stars and there will be a comparison of these calculations with observations. It has recently been found that there are large variations in the relative numbers of these stars in our galaxy as compared to the Magellanic Clouds, and the origin of this difference is not fully understood. 2) There will be theoretical calculations of the spectra which are expected to be observed from red giant stars. These calculations will be based on models that describe the physical processes that take place in the interiors of these stars, and there will be a comparison of such calculations with observations. 3) It is known that shells of gas and dust surround evolved stars. A study will be made of the gas phase and gas-grain photochemistry around such stars.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0009, THE CHEMICAL COMPOSITION OF LATE TYPE STARS

G. Wallerstein, University of Washington, School of Arts & Sciences, Dept. of Astronomy, *Seattle, Washington* 98105 (AST7820405)

This research will be concerned with determining the abundances in certain types of giant stars which show unusual abundances of the elements barium and strontium. The surface composition of these stars is enriched in elements which have been produced by a certain class of thermonuclear reactions known as slow neutron capture reactions. Studies of the abundances in these stars will provide us with information on the role various thermonuclear reactions play in these particular stars.

Another topic of study will involve the giant stars known as long-period variables. These stars are known to vary in light output. The period of this luminosity variation is of the order of hundreds of days. The behavior of the outer atmosphere of these stars is quite complex, and spectroscopic techniques can be used to provide information about the structure of the atmosphere during the light variation. This information will then be used to determine the velocities in various parts of the atmosphere during the pulsation.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

GENERAL

11.0001, MULTI-YEAR TASK CONTRACT FOR AEROSAT SYSTEMS

Unknown, Aerospace Corp., *P.O. Box 95085, Los Angeles, California* 90045 (FA77WA-3861; FA160311 (TRAIS NO.))

The total Systems Engineering Support efforts with which this contract is associated will encompass a variety of detailed tasks and extend over a period of years. A general list of expected tasks are as follows: Task 1. Development of National Plan; Task 2. Aerosat Program Implementation Plan; Task 3. System Engineering Support for Aerosat Program; Task 4. U.S. Aerosat System Integration; Task 5. International System Interfaces and Space Segment Integration; and Task 6. Operational System Planning and Analysis.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

11.0002, INVESTIGATION OF THE LONAR CRATER, INDIA

K. Fredriksson, Smithsonian Institution, Meteorites Div, *1000 Jefferson Dr. S.W., Washington, District of Columbia* 20560

The Lonar crater is of particular interest because it is located in the vast deccan basalt area and recent results of the U.S. Apollo missions to the moon indicate that large parts of the lunar surface are of basaltic composition. Drilling and trenching in and around the structure has been initiated by the Geological Survey of India and is continuing. Examination of the material recovered from this program has been initiated in our laboratory. Particular emphasis is being placed upon critical comparisons of the Lonar material with selected lunar material returned by the Apollo program.

SUPPORTED BY Smithsonian Institution, National Museum of Natural History

11.0003, AERO ENGINES IN MUSEUMS AROUND THE WORLD

R.B. Meyer, Smithsonian Institution, Dept. of Aeronautics, *1000 Jefferson Dr. S.W., Washington, District of Columbia* 20560

This is a list of 1,200 air-breathing engines (mostly piston gasoline and turbojets) in museums around the world.

It has been printed from punched cards and distributed to 100 supporting museums.

The additional information needed to produce a second and more complete edition is being collected. It is to be published in the summer of 1978.

SUPPORTED BY Smithsonian Institution, National Air & Space Museum

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Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N80-12991*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IN DEPTH REVIEW OF THE 1979 AIAA LIGHTER-THAN-AIR SYSTEMS TECHNOLOGY CONFERENCE
Mark D. Ardema Nov. 1979 20 p Conf. held at Palo Alto, Calif., 11-13 Jul. 1979
(NASA-TM-81158) Avail: NASA. Ames Res. Center, Moffett Field, Calif. 94035 CSCL 02A

The lighter than air (LTA) systems technology conference is reviewed. Highlights of the conference were: (1) the interest shown in patrol and surveillance airships, particularly for coastal patrol missions; (2) the session devoted to overviews of foreign activity; and (3) heavy lift and long range transport aircraft design considerations. A.W.H.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N80-12992 Virginia Polytechnic Inst. and State Univ., Blacksburg.
EFFECTS OF WALL WAVINESS AND NONLINEAR WAVE INTERACTIONS ON THE STABILITY OF BOUNDARY-LAYER FLOWS Ph.D. Thesis
Ali Nahit Bozati 1979 186 p
Avail: Univ. Microfilms Order No. 7924092

The effects of wall undulations on the stability of and nonlinear mode-mode interactions of disturbance waves in boundary layer flows are investigated by using a combination of perturbation and numerical methods. Nonparallel flow effects are retained in most of the cases treated. The waviness on a plate which can stabilize or destabilize the flow, depending on the flow and waviness parameters is discussed. Stabilizing the flow by transferring energy from the unstable Tollmien-Schlichting mode to a higher stable mode through a resonant wave coupling mechanism is examined. First order linear secondary instabilities associated with a time dependent flow consisting of the superposition of a basic flow and a finite amplitude fundamental wave are analyzed. Dissert. Abstr.

N80-12993 Virginia Polytechnic Inst. and State Univ., Blacksburg.
THREE-DIMENSIONAL VISCOUS HYPERSONIC FLOWS OVER GENERAL BODIES USING SHOCK-LAYER AND PARABOLIZED NAVIER-STOKES EQUATIONS Ph.D. Thesis
Prasada Rao Gogineni 1979 87 p
Avail: Univ. Microfilms Order No. 7924106

The three dimensional viscous hypersonic flowfield over blunted cones at large angles of attack, including crossflow separation, was solved using both viscous shock layer and parabolized Navier-Stokes equations (PNS). The viscous shock layer equations were used for the solution of windward region up to the crossflow separation point and the parabolized Navier-Stokes equations were used to complete the solution in the crossflow separated region. A fast implicit iterative technique known as the pseudo elimination method was used to solve the PNS equations, and the computing time was reduced by 35 percent. A computer code was developed using this technique, and calculations were made for two test cases, which typically encompass reentry flow conditions. Dissert. Abstr.

N80-12994*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SUMMARY OF LOW-SPEED LONGITUDINAL AERODYNAMICS OF TWO POWERED CLOSE-COUPLED WING-CANARD FIGHTER CONFIGURATIONS
John W. Paulson, Jr. and James L. Thomas Washington Dec. 1979 92 p refs
(NASA-TP-1535; L-13157) Avail: NTIS HC A05/MF A01 CSCL 01A

Investigations of the low speed longitudinal characteristics of two powered close coupled wing-canard fighter configurations are discussed. Data obtained at angles of attack from -2 deg to 42 deg, Mach numbers from 0.12 to 0.20, nozzle and flap deflections from 0 deg to 40 deg, and thrust coefficients from 0 to 2.0, to represent both high angle of attack subsonic maneuvering characteristics and conventional takeoff and landing characteristics are examined. Data obtained with the nozzles deflected either 60 deg or 90 deg and the flaps deflected 60 deg to represent vertical or short takeoff and landing characteristics are discussed. A.W.H.

N80-12995*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INCLUSION OF UNSTEADY AERODYNAMICS IN LONGITUDINAL PARAMETER ESTIMATION FROM FLIGHT DATA
M. J. Queijo, William R. Wells (Wright State Univ., Dayton, Ohio), and Dinesh A. Keskar Washington Dec. 1979 52 p refs
(NASA-TP-1536; L-13009) Avail: NTIS HC A04/MF A01 CSCL 01A

A simple vortex system, used to model unsteady aerodynamic effects into the rigid body longitudinal equations of motion of an aircraft, is described. The equations are used in the development of a parameter extraction algorithm. Use of the two parameter-estimation modes, one including and the other omitting unsteady aerodynamic modeling, is discussed as a means of estimating some acceleration derivatives. Computer generated data and flight data, used to demonstrate the use of the parameter-extraction algorithm are studied. A.W.H.

N80-12996*# Princeton Univ., N. J. Flight Research Lab.
AN EXPLORATORY INVESTIGATION OF THE STOL LANDING MANEUVER Final Report
Patrick H. Whyte Washington NASA Dec. 1979 74 p refs (Contract NAS2-7350)

(NASA-CR-3191; AMS-1231-T) Avail: NTIS HC A04/MF A01 CSCL 01A

The parameters influencing the STOL landing are identified and their effect on the ease and quality of the flare maneuver is discussed. Data from actual landings, supported by pilot commentary and pilot opinion rating, are analyzed. Hypotheses concerning the prediction of STOL handling qualities in the flare are proposed, and suggestions for future research are presented. A.W.H.

N80-12997*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

TRANSONIC AERODYNAMIC CHARACTERISTICS OF A SUPERSONIC CRUISE AIRCRAFT RESEARCH MODEL WITH THE ENGINES SUSPENDED ABOVE THE WING

Charles E. Mercer and George T. Carson, Jr. Dec. 1979 198 p refs

(NASA-TM-80145; L-12811) Avail: NTIS HC A09/MF A01 CSCL 01A

The influence of upper-surface nacelle exhaust flow on the aerodynamic characteristics of a supersonic cruise aircraft research configuration was investigated in a 16 foot transonic tunnel over a range of Mach numbers from 0.60 to 1.20. The arrow-wing transport configuration with engines suspended over the wing was tested at angles of attack from -4 deg to 6 deg and jet total pressure ratios from 1 to approximately 13. Wing-tip leading edge flap deflections of -10 deg to 10 deg were tested with the wing-body configuration. Various nacelle locations (chordwise, spanwise, and vertical) were tested over the ranges of Mach numbers, angles of attack, and jet total-pressure ratios. The results show that reflecting the wing-tip leading edge flap from 0 deg to -10 deg increased the maximum lift-drag ratio by 1.0 at subsonic speeds. Jet exhaust interference effects were negligible. R.E.S.

N80-12998*# Rockwell International Corp., Los Angeles, Calif.

AERODYNAMIC PRELIMINARY ANALYSIS SYSTEM. PART 1: THEORY Final Report

E. Bonner, W. Clever, and K. Dunn 1978 81 p refs (Contract NAS1-14686)

(NASA-CR-145284) Avail: NTIS HC A05/MF A01 CSCL 01A

A comprehensive aerodynamic analysis program based on linearized potential theory is described. The solution treats thickness and attitude problems at subsonic and supersonic speeds. Three dimensional configurations with or without jet flaps having multiple non-planar surfaces of arbitrary planform and open or closed slender bodies of non-circular contour may be analyzed. Longitudinal and lateral-directional static and rotary derivative solutions may be generated. The analysis was implemented on a time sharing system in conjunction with an input tablet digitizer and an interactive graphics input/output display and editing terminal to maximize its responsiveness to the preliminary analysis problem. Nominal case computation time of 45 CPU seconds on the CDC 175 for a 200 panel simulation indicates the program provides an efficient analysis for systematically performing various aerodynamic configuration tradeoff and evaluation studies. Author

N80-12999*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AERODYNAMIC CHARACTERISTICS OF WHEELCHAIRS

Paul L. Coe, Jr. 1979 20 p refs

(NASA-TM-80191; L-13240) Avail: NTIS HC A02/MF A01 CSCL 01A

The overall aerodynamic drag characteristics of a conventional wheelchair were defined and the individual drag contributions of its components were determined. The results show that a fiftieth percentile man sitting in the complete wheelchair would experience an aerodynamic drag coefficient on the order of 1.4. A.R.H.

N80-13000*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SUPERSONIC STABILITY AND CONTROL CHARACTERISTICS OF A CRUCIFORM MISSILE MODEL WITH DELTA WINGS AND AFT TAIL FIN CONTROL

William A. Corlett 1979 117 p refs

(NASA-TM-80171; L-13149) Avail: NTIS HC A06/MF A01 CSCL 01A

The static stability and control characteristics of a cruciform missile configuration with delta wings and aft tail fin controls were investigated during tests conducted in the Langley Unitary Plan wind tunnel at Mach numbers from 1.60 to 4.63 through an angle-of-attack range of -4 deg to 30 deg. Model roll orientation was varied from 0 deg to 135 deg. The results indicate good longitudinal stability and control characteristics throughout the test Mach number range. Relatively high induced rolling and yawing moments were apparent at asymmetric model roll angles for the lower test Mach numbers; however, sufficient roll and yaw control was available to trim to relatively high angles of attack and lift coefficients. A.R.H.

N80-13001*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

INVESTIGATION OF FLOW CHARACTERISTICS OVER MISSILE BODIES AT SUPERSONIC SPEEDS

Raymond L. Barger and Wallace C. Sawyer Dec. 1979 41 p refs

(NASA-TP-1579; L-13224) Avail: NTIS HC A03/MF A01 CSCL 01A

Three missile body shapes tested at Mach numbers of 1.50, 2.16, and 2.86 with angles of attack up to 30 degrees are described. The flow characteristics for each body shape are examined. The measured aerodynamic forces and moments are presented. The use of flow visualization techniques are described and the results such as vortex effects are discussed. A.W.H.

N80-13002*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.

EFFECTS OF FUSELAGE FOREBODY GEOMETRY ON LOW-SPEED LATERAL-DIRECTIONAL CHARACTERISTICS OF TWIN-TAIL FIGHTER MODEL AT HIGH ANGLES OF ATTACK

Peter C. Carr and William P. Gilbert Dec. 1979 73 p refs

(NASA-TP-1592; L-13270) Avail: NTIS HC A04/MF A01 CSCL 01A

Low-speed, static wind-tunnel tests were conducted to explore the effects of fighter fuselage forebody geometry on lateral-directional characteristics at high angles of attack and to provide data for general design procedures. Effects of eight different forebody configurations and several add-on devices (e.g., nose strakes, boundary-layer trip wires, and nose booms) were investigated. Tests showed that forebody design features such as fineness ratio, cross-sectional shape, and add-on devices can have a significant influence on both lateral-directional and longitudinal aerodynamic stability. Several of the forebodies produced both lateral-directional symmetry and strong favorable changes in lateral-directional stability. However, the same results also indicated that such forebody designs can produce significant reductions in longitudinal stability near maximum lift and can significantly change the influence of other configuration variables. The addition of devices to highly tailored forebody designs also can significantly degrade the stability improvements provided by the clean forebody. Author

N80-13003*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

FORCE AND MOMENT DATA FROM A WIND-TUNNEL TEST OF A TILT-NACELLE V/STOL PROPULSION SYSTEM WITH AN ATTITUDE CONTROL VANE

Mark D. Betzina Nov. 1979 108 p refs

(NASA-TM-81157; A-8013) Avail: NTIS HC A06/MF A01 CSCL 01A

A large scale, tilt nacelle V/STOL propulsion system, with an attitude control vane assembly mounted in the exhaust, was tested. The effectiveness of the control vane as well as the aerodynamic characteristics of the entire propulsion system were determined. The results, in the form of tabulated coefficients, for both the vane forces and moments and the total forces and moments produced by the propulsion system are presented. A.W.H.

N80-13004*# Southern Methodist Univ., Dallas, Tex. Dept. of Civil and Mechanical Engineering.

INVESTIGATION OF BLOWN BOUNDARY LAYERS WITH AN IMPROVED WALL JET SYSTEM Ph.D. Thesis. Final

Technical Report, 1 Jul. 1978 - Dec. 1979
K. R. Saripalli and R. L. Simpson Dec. 1979 321 p refs
(Grant NsG-1548)
(NASA-CR-162512) Avail: NTIS HC A14/MF A01 CSCL 01A

The behavior of two dimensional incompressible turbulent wall jets submerged in a boundary layer when they are used to prevent boundary layer separation on plane surfaces is investigated. The experimental set-up and instrumentation are described. Experimental results of zero pressure gradient flow and adverse pressure gradient flow are presented. Conclusions are given and discussed. J.M.S.

N80-13005# Sandia Labs., Albuquerque, N. Mex.
EXPERIMENTAL STUDY OF HEAT TRANSFER FROM A YAWED CYLINDER TO AIR WITH A CONSTANT WALL HEAT FLUX
Carolyn A. Pura Aug. 1979 152 p refs
(Contract EY-76-C-04-0789)
(SAND-79-8022) Avail: NTIS HC A08/MF A01

The heat transfer from a yawed cylinder to air for constant wall heat flux boundary condition was studied. Yaws of 0, 20, 40, and 60 degrees were used with a Reynolds number based on a freestream velocity of 1.1 x 10 to the 5th power. The design of the apparatus, the numerical determination of heat conduction within the cylinder, comparison of normal (0 degrees) results with previously published results, and the data obtained for the yaws mentioned are presented. A.W.H.

N80-13006# Admiralty Marine Technology Establishment, Teddington (England).
ASSESSMENT OF A METHOD FOR PREDICTING THE DRAG AND BOUNDARY LAYER DEVELOPMENT ON A BODY OF REVOLUTION AT ZERO INCIDENCE
D. J. Atkins London HMSO Mar. 1979 38 p refs
(AMTE(N)-R-78111; BR67646) Avail: NTIS HC A03/MF A01

A comparison between experimental data and a boundary layer and drag prediction method for bodies of revolution at zero incidence and high Reynolds number is discussed. The only physical input to the prediction method is that of transition position. In general, drag predictions agree well with measurements both in trend and in absolute magnitude predicted velocity profiles on afterbodies with an included semi-angle of less than about 15 deg also agree well with measurements. Finally, a modification to the method was developed which gives a better agreement between predicted and measured velocity profiles on fuller afterbodies provided that no flow separation takes place.
Author (ESA)

N80-13007# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemgsmechanik.
LARGE SCALE COHERENT STRUCTURES IN THE WAKE OF AXISYMMETRIC BODIES
Helmut V. Fuchs, Edzard Mercker (Tech. Univ., Berlin), and Ulf Michel 1978 43 p refs
(DFVLR-FB-78-28) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 15,30

The unsteady flow past a circular disk was studied with hot-wire and microphone probes. The velocity and pressure signals are shown to be continuously dominated by large scale coherent motions enveloping the wake flow as a whole. This suggests narrowband two-point space correlations as an experimental tool for describing spatial coherence and phase of the basically random signals. The specific symmetry imposed by the axisymmetric boundary conditions of the disk enables a decomposition of the large scale flow phenomena into relatively simple elementary structures or modes. The resulting azimuthal constituents are quantified in terms of their respective magnitudes and individual power spectra. Comparisons are made with the corresponding structures found in circular jets. Author (ESA)

N80-13008# Universite des Sciences et Techniques de Lille (France).
UNSTEADY FLOW CHARACTERISTICS IN THE NEAR WAKE OF A TWO DIMENSIONAL OBSTACLE [QUELQUES PROPRIETES DE L'ECOULEMENT INSTATIONNAIRE DANS LE SILLAGE PROCHE D'UN OBSTACLE BIDIMENSIONNEL]
A. Dyment and P. Gryson Paris Assoc. Aeron. et Astronautique de France 1979 26 p refs In FRENCH Presented at 15th Colloq. d'Aerodyn. Appl., Marseille, 7-9 Nov. 1978
(AAAF-NT-79-08; ISBN-2-7170-0535-5) Avail: NTIS HC A03/MF A01; CEDOCAR, Paris FF 17 (France and EEC) FF 21 (others)

The influence of the characteristics of the boundary layer separation on the formation of vortices and alternate paths in the wake of a bidimensional obstacle at high Reynolds numbers was studied using an ultra fast visualization system. It is shown that there are alternate paths for laminar and turbulent flows, with similar flow characteristics. The emission of vortices does not change substantially when the flow passes from laminar to turbulent. A film with a time scale change of 10,000 times illustrates some of the discussed phenomena. Author (ESA)

N80-13009# Association Aeronautique et Astronautique de France, Paris.
UNSTEADY TURBULENCE IN OSCILLATING FLOW [TURBULENCE INSTATIONNAIRE DANS DES ECOULEMENTS PERIODIQUES]
M. Favre-Marinet and G. Binder 1979 23 p refs In FRENCH; ENGLISH summary Presented at 15th Colloq. d'Aerodyn. Appl., Marseille, 7-9 Nov. 1978
(AAAF-NT-79-11; ISBN-2-7170-0538-2) Avail: NTIS HC A02/MF A01; CEDOCAR, Paris FF 17 (France and EEC) FF 21 (others)

Turbulence measurements were made in a jet pulsating at high frequency (Strouhal number = 0.33). Overall averages of various turbulent quantities, in particular of the shear stress, demonstrate that the turbulent activity varies considerably during the cycle. It is shown that, under the conditions of this experiment, some closure assumptions of quasi-stationary models which have been applied to unsteady flow are not satisfactory. Author (ESA)

N80-13010# Royal Aircraft Establishment, Farnborough (England).
A THEORETICAL STUDY OF THE SUPERCRITICAL AEROFOIL NLR 7301, AND COMPARISON WITH EXPERIMENTS
R. C. Lock London HMSO Sep. 1978 48 p refs
(RAE-TR-78119; RAE-Aero-3444; BR66980) Avail: NTIS HC A03/MF A01

The airfoil NLR 7301, 16.5% thick, was designed using a generalized hodograph method to give supercritical (inviscid) shock-free flow at the design conditions M = 0.72, C sub L = 0.6. A theoretical study of this airfoil by the latest form of the 'VGK' method for calculating viscous effects in two dimensional transonic flows is described. Comparisons are given with experiments in the NLR pilot tunnel at a low Reynolds number (2,000,000). Large discrepancies are shown near the design condition and at higher Mach numbers which are ascribed to a laminar (transitional) shock wave/boundary layer interaction in the transition-free experiments; this causes an apparent weakening of the shock wave and a spuriously low level of the measured drag. Calculations were made at two higher Reynolds numbers, with transition fixed near the leading edge (10,000,000) to simulate conditions in a medium-sized wind tunnel; and 50,000,000, typical of full-scale conditions. Favorable scale effects are predicted on drag rise Mach numbers, for C sub L > 0.5, and on separation onset at all lift coefficients. Author (ESA)

N80-13011# European Space Agency, Paris (France). Inst. fuer Dynamik Verduennter Gase.
MOLECULAR TWO DIMENSIONAL FLOW OF MIXTURES OF LIGHT AND HEAVY GASES WITH DIFFUSE AND SPECULAR REFLECTION
Walter Wuest (DFVLR, Goettingen, West Germany) Dec. 1978 29 p refs Transl. into ENGLISH of "Molekulare ebene Stroemung von Gemischen leichter und schwerer Gase mit diffuser und spiegelnder Reflexion", DFVLR, Goettingen, West Ger. Report DLR-FB-77-51, 17 Nov. 1978 Original report in GERMAN previously announced as N78-31060 Original German report available from DFVLR, Cologne DM 14,40
(ESA-TT-508-Rev; DLR-FB-77-51) Avail: NTIS HC A03/MF A01

A simpler case of the proposed Spacelab experiment in which

the extreme vacuum at the lee side of a shield is utilized for flow experiments, is discussed. Two dimensional density fields are calculated for diffuse and specular reflection for the flow around a plate strip and a half cylinder, facing either the convex or the concave side of the flow. In the latter case the specularly reflected molecules are focused with strong compression (focused or caustic flow fields). Author (ESA)

N80-13012# European Space Agency, Paris (France).
EXPERIMENTAL INVESTIGATION OF THE LOCAL DENSITY AND TEMPERATURE DISTRIBUTION IN THE FLOW FIELD AROUND A SPHERE WITH HIGH THERMODYNAMIC NONEQUILIBRIUM USING THE ELECTRON BEAM TECHNIQUE
Gustav Schweiger (DFVLR, Cologne, West Germany) Jul. 1979 165 p refs Transl. into ENGLISH of "Experimentelle untersuchung der loialen-dichte-und temperaturverteilung im stroemungsfeld um ein kugelmodell bei starkem thermodynamischen nichtgleichgewicht mit dem elektronestrahlverfahren", DFVLR, Cologne Report DLR-FB-77-29, 30 May, 1979 Original German report available from DFVLR, Cologne DM 51.50
(ESA-TT-516-Rev; DLR-FB-77-29) Avail: NTIS HC A08/MF A01

Measurements of the local density and temperature in the stagnation region of a spherical model in a hypersonic high enthalpy were made using the electron beam technique. The influence of quenching collisions, secondary electrons, and gas temperature on the density measurements is investigated. The various known excitation models and data reduction methods are described and compared. A data reduction scheme based on the Smith-model is developed, which is especially suitable at high gas temperatures. The experimental set up used for density and temperature measurements in the flow field around a sphere at high thermodynamic nonequilibrium is described. The influence of secondary electrons and nonequilibrium effects on the temperature measurements is analyzed. Temperature and density profiles on the stagnation line of a sphere in a M = 12, Re = 120 flow at Tw/To = 0.006 are presented. On the basis of this and similar measurements a modification of the present limitations of different flow regimes is proposed. Author (ESA)

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

N80-13013*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WEAR, FRICTION, AND TEMPERATURE CHARACTERISTICS OF AN AIRCRAFT TIRE UNDERGOING BRAKING AND CORNERING
John L. McCarty, Thomas J. Yager, and S. R. Riccitiello (NASA. Ames Res. Center) Washington Dec. 1979 40 p refs
(NASA-TP-1569; L-13239) Avail: NTIS HC A03/MF A01 CSCL 01C

An investigation to evaluate the wear, friction, and temperature characteristics of aircraft tire treads fabricated from different elastomers is presented. The braking and cornering tests performed on aircraft tires retreaded with currently employed and experimental elastomers are described. The tread wear rate is discussed in relation to the slip ratio during braking and yaw angle during cornering. The extent of wear in either operational mode is examined in relation to the runway surface. A.W.H.

N80-13014# Civil Aeromedical Inst., Oklahoma City, Okla.
EVALUATION OF SEATING AND RESTRAINT SYSTEMS CONDUCTED DURING FISCAL YEAR 1978
Richard F. Chandler and Edwin M. Trout Jun. 1979 228 p refs
(AD-A074881; FAA-AM-79-17) Avail: NTIS HC A11/MF A01 CSCL 01/2

Results are presented of test programs conducted by the Protection and Survival Laboratory to investigate the performance of prototype or operational seating and restraint systems relative to their ability to provide protection against crash injury and to validate the performance of the FAA Seat Occupant Model: Light Aircraft (SOMLA). M.M.M.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications*.

N80-13015 Cornell Univ., Ithaca, N. Y.
SATELLITE DOPPLER POSITIONING IN STRENGTHENING GEODETIC NETWORKS Ph.D. Thesis
Aderibigbe Akanni Taiwo 1979 157 p
Avail: Univ. Microfilms Order No. 7926975

The effective use of satellite Doppler positioning in strengthening terrestrial geodetic networks was geometrically analyzed with respect to scale and orientation. A rigorous mathematical model was used for combining satellite and terrestrial networks. Computations and analyses using real terrestrial and satellite Doppler network data from the Sudan survey department 9 point network and from the United States National Geodetic Survey 132 point network were performed and are presented. The results show that satellite Doppler derived positions used in combination with terrestrial geodetic positions can provide important geodetic parameters and information about a network through the use of a properly conceived mathematical model. The distortions in the network can be properly evaluated. Dissert. Abstr.

N80-13016# Systems Control, Inc., Palo Alto, Calif.
ESTABLISHMENT CRITERIA FOR DISTANCE MEASUREMENT EQUIPMENT (DME) WITH INSTRUMENT LANDING SYSTEM AND/OR LOCALIZER APPROACH Final Report
H. L. Solomon, W. Heine, and M. Venturino Dec. 1978 68 p refs
(Contracts DOT-FA77WAI-731; WI-78-3434-1)
(AD-A069818; FAA-ASP-78-7) Avail: NTIS HC A04/MF A01 CSCL 17/7

The benefit/cost analysis presented considers the following factors: (1) use of DME in lieu of ILS outer marker beacon; (2) reduced probability of approach accidents; (3) averted flight disruptions due to reduced localizer minima; (4) averted missed approaches due to additional information provided; and (5) expedited aircraft departures due to reduced departure flight path length. M.M.M.

N80-13017# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE AIRCRAFT REPLY AND INTERFERENCE ENVIRONMENT SIMULATOR (ARIES). VOLUME 3: PROGRAMMER'S MANUAL
Michael Goon and D. A. Spencer 22 Mar. 1979 63 p refs
(Contracts DOT-FA77WAI-261; F19628-78-C-0002; FAA Proj. 052-241-04)
(AD-A074424; ATC-87-Vol-3) Avail: NTIS HC A04/MF A01 CSCL 09/2

The ARIES Programmer's Manual presented describes the operation, signal formats and protocols of the Lincoln Laboratory-built input/output devices controlled by the Eclipse computer. The descriptions are primarily concerned with the logic of the interface boards that reside in the computer chassis and the formats of the words transferred to and from the computer. The logic of the devices themselves is described only to the extent necessary to understand the interface protocols and data formats. M.M.M.

N80-13018# Ohio Univ., Athens. Avionics Engineering Center.
IN-SERVICE IMPROVEMENTS AND MODERNIZATION OF

ALL COMPONENTS OF THE INSTRUMENT LANDING SYSTEMS. VOLUME 1: SECTIONS 1-10 Final Report
Jul. 1978 675 p refs
(Contract DOT-FA75WA-3549)
(AD-A074425; EER-35-1-Vol-1; FAA-RD-78-112-Vol-1) Avail: NTIS HC A99/MF A01 CSCL 17/7

Improvements and alternative utilization of the instrument landing (ILS) glide slope and localizer systems are considered. It is concluded that the ILS is a highly flexible and important navigational aid, with many possibilities for alternative use waiting to be fully realized. J.M.S.

N80-13019# Ohio Univ., Athens. Avionics Engineering Center.
IN-SERVICE IMPROVEMENTS AND MODERNIZATION OF ALL COMPONENTS OF THE INSTRUMENT LANDING SYSTEMS. VOLUME 2: SECTIONS 11 AND 12 Final Report, Oct. 1974 - Jul. 1978
Jul. 1978 858 p refs 2 Vol.
(Contract DOT-FA75WA-3549)
(AD-A074426; EER-35-1-Vol-2; FAA-RD-78-112-Vol-2) Avail: NTIS HC A99/MF A01 CSCL 17/7

Results of an evaluation of localizer and glide-slope systems are given emphasizing antenna and monitor performance, terrain effects, and the effects of obstructions. Also, details of analyses and flight evaluations of Alford and Hollins localizer systems are provided together with findings during evaluations of the Watts Mark 1, 2, and 3 endfire, glide-slope systems. Technical results of development and evaluation work on the FAA-suggested techniques for determining range-rate and position during approach using the localizer signal are given. Nondestructive instrument landing system (ILS) fault testing techniques are described, as is a plan for development of an airport systems control/display facility. Special devices and techniques for use in ILS field work such as a mini-laboratory for collection of airborne data, digital data collection system, time domain reflectometry, and mathematical modeling to predict localizer and glide slope performance and facilitate setups are discussed. J.M.S.

N80-13020*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENTAL DETERMINATION OF POSITION-ESTIMATE ACCURACY USING BACK-AZIMUTH SIGNALS FROM A MICROWAVE LANDING SYSTEM
Charles E. Knox Dec. 1979 37 p
(NASA-TP-1574; L-13074) Avail: NTIS HC A03/MF A01 CSCL 17G

Flight tests using the Boeing 737 airplane to obtain position estimates with back azimuth signals from a microwave landing system (MLS) are discussed. The equations and logic used to generate a navigation position estimate in the MLS back azimuth signal environment are described. The error in the navigation position estimate is determined. A summary of the Boeing 737 position estimate update process is described. The navigation position estimate error calculated flight data and radar tracking information is analyzed. The position estimate error data using the MLS inputs are compared with error data obtained during dual distance measuring equipment updates. A.W.H.

N80-13021# Prakla-Seismos G.m.b.H., Hannover (West Germany).
FURTHER DEVELOPMENT OF THE RADIO-ANA-SYSTEM Final Report
Friedhelm Sender Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1978 94 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-M-78-05) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Ger. DM 19.75

The Radio-ANA-System for high seas navigation is presented and enhanced exploitation is discussed. Improvement of several aspects of the system is suggested. These are: expanding the usable range of the LORAN-C System by improved receiving techniques, integrating a navigation-reference-buoy into the VLF-radio navigation concept, and providing improved navigational software to solve the special problems of the Radio-ANA-System and Satellite Navigation network. Author (ESA)

N80-13022# European Space Agency, Paris (France). Inst. fuer Flugmechanik.
THE SUPERPOSITION OF TWO-DIMENSIONAL ERROR FIELDS AND ITS INFLUENCE ON FLIGHT SAFETY OF AIR TRAFFIC
Otto Weber (DFVLR, Brunswick, West Germany) Mar. 1979 59 p refs Transl. into ENGLISH of "Die Ueberlagerung Zweidimensionaler Fehlerfelder und ihr Einfluss auf die Flugsicherheit im Luftverkehr", DFVLR, Brunswick Report DLR-FB-77-64, 21 Dec. 1978 Original German report available from DFVLR, Cologne DM 27.20
(ESA-TT-527-Rev; DLR-FB-77-64) Avail: NTIS HC A04/MF A01

The superposition of two dimensional error fields and their effects on air traffic flight safety are discussed. Local error fields significant with regard to flight safety are investigated and described by means of error ellipses, 95% circles, and other curves representing the same probability. Taking the upper wind field over Schleswig as an example, conclusions are drawn concerning the frequency distributions of asymmetrical real phenomena. Statistical laws for determining the mean error vector and the covariance matrix of a superimposed field from the corresponding values of the original normal distribution error fields are also discussed, and rules are given regarding the shape and the error contour area of the superposition. The safety cushion provided by the superposition of a ring shaped or extreme radical distribution with a normal distribution is contrasted to that provided by the superposition of two error fields having normal distributions. Author (ESA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N80-13023# Sandia Labs., Albuquerque, N. Mex. Aerodynamics Dept. 5630.
AERODYNAMIC DESIGN OF AN EXTENDED-RANGE GUIDED BOMB
Randall C. Maydew 18 Jun. 1979 49 p refs Backup document for AIAA synoptic scheduled for publication in Journal of Aircraft on Mar. 1980
(Log-C3719) Avail: NTIS HC A03/MF A01

The extended range bomb designed to provide a low altitude, 15 km stand off or a 2.5 km turn radius, return to target delivery capability from aircraft at release speeds from 330 to 800 KCAS is examined. The rocket boosted, 41.9 cm diameter bomb utilizes two orthogonal pairs of pneumatically actuated canards for attitude control and lift. The guidance and control system consists of a strapdown inertial measurement unit and a digital computer containing an autopilot and navigator. Computer simulations which indicated the canards must provide high lift with nearly linear characteristics to angles of attack of about 20 deg are discussed. Wind tunnel tests conducted to optimize the canard design are described and the results evaluated. A.W.H.

N80-13024*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
APPLICATION OF MODIFIED PROFILE ANALYSIS TO FUNCTION TESTING OF THE MOTION/NO-MOTION ISSUE IN AN AIRCRAFT GROUND-HANDLING SIMULATION
Russell V. Parrish, Burnell T. McKissick, and George G. Steinmetz Washington Dec. 1979 24 p refs
(NASA-TP-1540; L-13028) Avail: NTIS HC A02/MF A01 CSCL 01C

A recent modification of the methodology of profile analysis, which allows the testing for differences between two functions as a whole with a single test, rather than point by point with multiple tests is discussed. The modification is applied to the examination of the issue of motion/no motion conditions as shown by the lateral deviation curve as a function of engine cut speed of a piloted 737-100 simulator. The results of this

application are presented along with those of more conventional statistical test procedures on the same simulator data. A.W.H.

N80-13025*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ANALYTICAL INVESTIGATION OF THE LANDING DYNAMICS OF A LARGE AIRPLANE WITH A LOAD-CONTROL SYSTEM IN THE MAIN LANDING GEAR
John R. McGehee and Huey D. Carden Dec. 1979 85 p refs
(NASA-TP-1555; L-13250) Avail: NTIS HC A05/MF A01 CSCL 01C

The results of an evaluation of an active load-control landing gear computer program (ACOLAG) for predicting the landing dynamics of airplanes with passive and active main gears are presented. ACOLAG was used in an analytical investigation of the landing dynamics of a large airplane with both passive and active main gears. It was concluded that the program is valid for predicting the landing dynamics of airplanes with both passive and active main gears. It was shown that the active gear reduces airframe-gear forces and airplane motions following initial impact, and has the potential for significant reductions in structural fatigue damage relative to that which occurs with the passive gear. M.M.M.

N80-13026*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPLORATORY STUDY OF THE EFFECTS OF WING-LEADING-EDGE MODIFICATIONS ON THE STALL/SPIN BEHAVIOR OF A LIGHT GENERAL AVIATION AIRPLANE
Dec. 1979 98 p refs
(NASA-TP-1589; L-13143) Avail: NTIS HC A05/MF A01 CSCL 01C

Configurations with full-span and segmented leading-edge flaps and full-span and segmented leading-edge droop were tested. Studies were conducted with wind-tunnel models, with an outdoor radio-controlled model, and with a full-scale airplane. Results show that wing-leading-edge modifications can produce large effects on stall/spin characteristics, particularly on spin resistance. One outboard wing-leading-edge modification tested significantly improved lateral stability at stall, spin resistance, and developed spin characteristics. A.R.H.

N80-13027*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
FRICTION CHARACTERISTIC OF STEEL SKIDS EQUIPPED WITH SKEGS ON A LAKEBED SURFACE
Walter J. Sefic Dec. 1979 16 p refs
(NASA-TM-81347; H-1111) Avail: NTIS HC A02/MF A01 CSCL 01C

The coefficient of friction was determined for steel skids with and without skegs. The addition of a 1.27 centimeter deep skeg caused the coefficient of friction to increase from an average value of .36 to .53, a 47 percent increase over the flat skid. The addition of a .64 centimeter deep skeg increased the friction coefficient from .36 to .46, a 16 percent increase over the flat skid. Comparisons are made with data for similar test conditions obtained during the X-15 program. A.R.H.

N80-13028*# Boeing Vertol Co., Philadelphia, Pa.
ANALYSIS AND CORRELATION WITH THEORY OF ROTOR LIFT-LIMIT TEST DATA
Marc Sheffler Nov. 1979 126 p refs
(Contract NAS1-14317)
(NASA-CR-159139) Avail: NTIS HC A07/MF A01 CSCL 01C

A wind tunnel test program to define the cruise performance and determine any limitations to lift and propulsive force of a conventional helicopter rotor is described. A 2.96 foot radius model rotor was used. The maximum lift and propulsive force obtainable from an articulated rotor for advance ratios of 0.4 to 0.67, and the blade load growth as the lift approaches the limit are determined. Cruise rotor performance for advance ratios of 0.4 to 0.67 and the sensitivity of the rotor forces and moments to rotor control inputs as the lift limit is approached are established. A.W.H.

N80-13029# Kaman Aerospace Corp., Bloomfield, Conn.
DESIGN ASSESSMENT OF ADVANCED TECHNOLOGY LIGHTWEIGHT, LOW-COST MISSION-CONFIGURED GONDOLA MODULES Final Report, Aug. 1978 - Mar. 1979
John D. Porterfield Jul. 1979 175 p refs
(Contract DAAK51-78-C-0012; DA Proj. 1L1-62209-AH-76)
(AD-A073554; R-1568; USARTL-TR-79-16) Avail: NTIS HC A08/MF A01 CSCL 15/5

The objectives of this program were to identify applicable high strength materials and efficient structural concepts for application to various elements of the helicopter external gondola system (HEGS) and to subsequently prepare preliminary design arrangements for the HEGS-10, HEGS-20, and HEGS-Palletized modules. GRA

N80-13030# Rockwell International Corp., El Segundo, Calif. Los Angeles Div.
MECHANICAL POWER SYSTEM FOR AIRCRAFT INTERMITTENT UTILITY FUNCTIONS Final Technical Report, Mar. 1975 - Feb. 1979
C. W. Helsley Apr. 1979 282 p refs
(Contract F33615-75-C-2011; AF Proj. 3145)
(AD-A073297; RI/LAD-NA-79-64; AFAPL-TR-79-2028) Avail: NTIS HC A13/MF A01 CSCL 01/3

The program reported upon herein is designed to develop a satisfactory method for utilizing flywheel energy in an aircraft control system. To attain this objective, the program will design, fabricate and demonstrate a mechanical power package (MPP) for controlling and powering a high-horsepower utility actuation function. The MPP will consist of a hydraulic motor, a flywheel, an adapter gearbox, a controller, and a screwjack actuator, and will be designed to replace an existing hydraulic actuator. GRA

N80-13031# Ballistic Research Labs., Aberdeen Proving Ground, Md.
COMPUTER DESCRIPTION OF BLACK HAWK HELICOPTER Final Report
Gary G. Kuehl Jun. 1979 321 p refs Supersedes ARBRL-IMR-605
(AD-A073444; AD-E430285; ARBRL-TR-02172; ARBRL-IMR-605) Avail: NTIS HC A14/MF A01 CSCL 01/3

A computer description of the geometry of the Black Hawk Helicopter was made. This description was made using the technique of combinatorial geometry (COM-GEOM) and will be used as input to the GIFT computer code which generates data used in target vulnerability analyses. This report describes the method used in modelling the helicopter. The appendix contains computer listings of the data comprising the computer description of the vehicle. GRA

N80-13032# Northrop Research and Technology Center, Palos Verdes Peninsula, Calif.
INVESTIGATION OF ADVANCED PROGNOSTIC ANALYSIS TECHNIQUES Final Report
Ralph C. Grove Jun. 1979 261 p refs
(Contract DAAJ02-77-C-0054; DA Proj. 1L2-62209-AH-76)
(AD-A073553; NRTC-78-47R; USARTL-TR-79-10) Avail: NTIS HC A12/MF A01 CSCL 01/3

This report presents the results of an experimental program with the following objectives: to collect and process test data from six different UH-1 helicopter 90 degree gearboxes, tested for a total of 4712 hours under controlled conditions, and to perform a theoretical investigation and data analysis to develop and optimize trend detection and prediction algorithms for application to the processed test cell data in order to establish valid predictions of gearbox failure time. A variety of sensors were used to monitor the wear occurring in the gearboxes including oil debris monitors, accelerometers, a shock pulse analyzer, and temperature sensors. Spectrometric oil analyses of the gearbox oil were performed on daily samples from the gearbox oil reservoir. The gearboxes were disassembled and inspected for wear prior to and following each test. Wear measurement techniques included visual inspection by an expert, measurements of ball and ball track wear, dynamic noise testing of bearings, and scanning electron microscope photographs of the surface of one ball from each bearing. GRA

N80-13033# Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.

A COMPUTERIZED VSTOL/SMALL PLATFORM LANDING DYNAMICS INVESTIGATION MODEL Final Report

Ronald L. Nave 30 Sep. 1977 295 p (WF41421203)

(AD-A073587; NADC-77024-30) Avail: NTIS HC A13/MF A01 CSCL 01/2

A digital computer program has been developed to investigate the dynamic interaction between VSTOL aircraft and ships. The model includes the ship, aircraft, pilot, and air turbulence. At present the aircraft model is configured to represent the AV8A Harrier, but other aircraft may be simulated by simple program changes. GRA

N80-13034# ARO, Inc., Arnold Air Force Station, Tenn.

A-10 CARRIAGE LOADS TEST Final Report, 26 May - 3 Jun. 1978

T. O. Shadow AEDC Jun. 1978 48 p Sponsored by the Air Force

(AD-A073442; AEDC-TSR-78-P9) Avail: NTIS HC A03/MF A01 CSCL 01/3

A wind tunnel test was conducted with a 0.05 scale model of the A-10 aircraft to obtain carriage loads data for various external store configurations. The external stores consisted of 14 different bombs and pods, four different loading racks, and three 600 gal ferrying tanks mounted in various combinations on all 11 pylons. The loads imposed by the stores on the pylons were measured on six of the 11 pylons with strain-gage balances mounted inside the pylons. Mach number was varied from 0.3 to 0.75 and aircraft sideslip angle was varied from -18 to 18 deg at constant angles of attack of 0, 5, 10, 15, and 20 deg. GRA

N80-13035# Royal Aircraft Establishment, Farnborough (England).

THE USE OF STRIP THEORY IN THE DYNAMICS OF DEFORMABLE AIRCRAFT

D. L. Woodcock London HMSO Aug. 1978 120 p refs (RAE-TM-Struct-933; BR66481) Avail: NTIS HC A06/MF A01

A detailed formulation of the equations of motion of a deformable aircraft is given. The development is from Lagrange's equations for an inertial frame and is made in terms of the position, orientation, force, and inertia properties of narrow strips of the aircraft which lie fore and aft in the unperturbed state. The latter is one of constant linear velocity and zero angular velocity. Particular account is taken of the deformation and loading in the unperturbed state. Author (ESA)

N80-13036# Royal Aircraft Establishment, Farnborough (England).

FORMULATION OF THE EQUATIONS OF MOTION OF A DEFORMABLE AIRCRAFT USING LAGRANGE'S EQUATIONS IN AN ARBITRARY NON-INERTIAL FRAME OF REFERENCE

D. L. Woodcock London Dec. 1978 101 p refs (RAE-TM-Struct-941; BR66754) Avail: NTIS HC A06/MF A01

The equations of motion of a deformable aircraft are developed in detail from Lagrange's equations for a non-inertial frame. By an appropriate choice of deformation modes the principal frame of reference can be specified as, for example, mean-body axes or body-fixed axes. Particular account is taken of the influence of the propulsive and effective forces produced by power units containing rotating parts. The development ventures to a certain extent into the non-linear regime. Author (ESA)

N80-13037# Royal Aircraft Establishment, Farnborough (England).

THE EQUATIONS OF MOTION OF AN AIRCRAFT EMBRACING ITS WHOLE-BODY AND DEFORMATIONAL DEGREES OF FREEDOM

C. H. E. Warren London HMSO Jan. 1979 58 p refs (RAE-TR-79010; RAE-Struct-YSE/B/0778; BR67362) Avail: NTIS HC A04/MF A01

The problem of unifying and relating the approaches adopted by the flight dynamicist who makes small perturbation studies of the behavior of an aircraft in its whole-body degrees of freedom and by the structural dynamicist who makes similar studies of the behavior in its deformational degrees of freedom is considered. A framework for a common approach is outlined. It goes as far as deriving the equations of motion and shows how the terms, etc., in these equations relate to those traditionally used by the flight dynamicist and structural dynamicist. Author (ESA)

N80-13038# Royal Aircraft Establishment, Farnborough (England).

A SUGGESTION AS TO A GENERAL DERIVATION OF THE EQUATIONS OF MOTION OF A DEFORMABLE AIRCRAFT FOR SMALL PERTURBATIONS WHICH WILL BE MOST GENERALLY ACCEPTABLE

D. L. Woodcock London HMSO Jan. 1979 53 p refs (RAE-TR-79011; RAE-Struct-BF/B/0777; BR67657) Avail: NTIS HC A04/MF A01

A general derivation of the equations of motion of a deformable aircraft for small perturbations is offered which, it is hoped, will be acceptable to all traditions and inclinations. The deformations are represented by an expression which is precisely linear in the generalized coordinates. Lagrange's equation for an arbitrary noninertial frame is used, along with the principles of momentum, and it is shown how the resulting equations of motion can be particularized to suit various tastes. An appendix considers to some extent the determination of the Phugoid and shows that the traditional structural dynamicist's approach is just as adequate as that of the flight dynamicist. Author (ESA)

N80-13039# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.

BEAVER AIRCRAFT PARAMETER IDENTIFICATION: TECHNICAL PREPARATIONS AND PRELIMINARY RESULTS

Henry C. Garretson, III 1978 79 p refs (DFVLR-Mitt-78-01) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 28.30

Various factors affecting aircraft parameter identification are examined. A review of the preparation/flight test phases of this research program is presented. The Beaver aircraft digital simulation program, aircraft flight test instrumentation, and test data processing are described. Input signal optimization techniques are discussed and signals optimized using four different methods are presented. Production of a tape which automatically applied the optimized input signals in flight is described. The flight test phase consisted of 14 flights and resulted in useful data for 110 individual maneuvers. Preliminary identification results from representative maneuvers are given. Author (ESA)

N80-13040# New Mexico Univ., Albuquerque. Technology Application Center.

REMOTELY PILOTED VEHICLES. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1974 - Jul. 1979

Samuel C. Mauk Sep. 1979 47 p Sponsored by NTIS (NTIS/PS-79/0875/9) Avail: NTIS HC $28.00/MF $28.00 CSCL 01C

Articles concerning aircraft design, flight tests, aircraft control, cost effectiveness automatic flight control, automatic pilots, and data links are presented. Civil aviation applications are included, although military uses of remotely piloted vehicles are stressed. Contains 181 citations. GRA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N80-13041*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

FLIGHT TEST OF NAVIGATION AND GUIDANCE SENSOR ERRORS MEASURED ON STOL APPROACHES

David N. Warner and F. J. Moran Dec. 1979 42 p (NASA-TM-81154; A-8008) Avail: NASA. Ames Res. Center,

Moffett Field, Calif. 20546 CSCL 01D

Navigation and guidance sensor error characteristics were measured during STOL approach-flight investigations. Data from some of the state sensors of a digital avionics system were compared to corresponding outputs from an inertial navigation system. These sensors include the vertical gyro, compass, and accelerometers. Barometric altimeter data were compared to altitude measured by a tracking radar. Data were recorded with the Augmentor Wing Jet STOL Research Aircraft parked and in flight. Author

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N80-13042# National Aviation Facilities Experimental Center, Atlantic City, N. J.

EXHAUST EMISSIONS CHARACTERISTICS FOR A GENERAL AVIATION LIGHT AIRCRAFT TELEDYNE CONTINENTAL MOTORS 6-285-B PISTON ENGINE Final Report

Eric E. Becker Aug. 1979 98 p refs

(AD-A074338; FAA-NA-79-30; FAA-RD-79-67) Avail: NTIS HC A05/MF A01 CSCL 21/7

The 6-285-B engine was tested to develop an exhaust emissions data base. The data base consists of current production baseline emissions characteristics, lean out emissions data, effects of leaning out the fuel schedule on cylinder head temperatures, and data showing ambient effects on exhaust emissions and cylinder head temperatures. A.W.H.

N80-13043*# Boeing Co., Seattle, Wash. Advanced Airplane Branch.

COMPUTER CODE FOR ESTIMATING INSTALLED PERFORMANCE OF AIRCRAFT GAS TURBINE ENGINES. VOLUME 1: FINAL REPORT

Edward J. Kowalski Dec. 1979 204 p refs 3 Vol.

(Contract NAS3-21238)

(NASA-CR-159691; D180-25481-1-Vol-1) Avail: NTIS HC A10/MF A01 CSCL 21E

A computerized method which utilizes the engine performance data is described. The method estimates the installed performance of aircraft gas turbine engines. This installation includes: engine weight and dimensions, inlet and nozzle internal performance and drag, inlet and nacelle weight, and nacelle drag. A.W.H.

N80-13044*# Boeing Co., Seattle, Wash. Advanced Airplane Branch.

COMPUTER CODE FOR ESTIMATING INSTALLED PERFORMANCE OF AIRCRAFT GAS TURBINE ENGINES. VOLUME 2: USERS MANUAL

Edward J. Kowalski Dec. 1979 444 p 3 Vol.

(Contract NAS3-21238)

(NASA-CR-159692; D180-25481-2-Vol-2) Avail: NTIS HC A19/MF A01 CSCL 21E

A computerized method which utilizes the engine performance data and estimates the installed performance of aircraft gas turbine engines is presented. This installation includes: engine weight and dimensions, inlet and nozzle internal performance and drag, inlet and nacelle weight, and nacelle drag. A user oriented description of the program input requirements, program output, deck setup, and operating instructions is presented. A.W.H.

N80-13045*# Boeing Co., Seattle, Wash. Advanced Airplane Branch.

COMPUTER CODE FOR ESTIMATING INSTALLED PERFORMANCE OF AIRCRAFT GAS TURBINE ENGINES. VOLUME 3: LIBRARY OF MAPS

Edward J. Kowalski Dec. 1979 415 p refs 3 Vol.

(Contract NAS3-21238)

(NASA-CR-159693; D180-25481-3-Vol-3) Avail: NTIS HC A18/MF A01 CSCL 21E

A computerized method which utilizes the engine performance data and estimates the installed performance of aircraft gas turbine engines is presented. This installation includes: engine weight and dimensions, inlet and nozzle internal performance and drag, inlet and nacelle weight, and nacelle drag. The use of two data base files to represent the engine and the inlet/nozzle/aftbody performance characteristics is discussed. The existing library of performance characteristics for inlets and nozzle/aftbodies and an example of the 1000 series of engine data tables is presented. A.W.H.

N80-13046*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

FLUTTER SPECTRAL MEASUREMENTS USING STATIONARY PRESSURE TRANSDUCERS

A. P. Kurkov 1980 15 p refs Presented at the 25th Annual Intern. Gas Turbine Conf. and the 22d Annual Fluids Eng. Conf., New Orleans, 9-13 Mar. 1980; sponsored by ASME

(NASA-TM-79293; E-237) Avail: NTIS HC A02/MF A01 CSCL 21E

Engine-order sampling was used to eliminate the integral harmonics from the flutter spectra corresponding to a case-mounted static pressure transducer. Using the optical displacement data, it was demonstrated that the blade-order sampling of pressure data may yield erroneous results due to the interference caused by blade vibration. Two methods are presented which effectively eliminate this interference yielding the blade-pressure-difference spectra. The phase difference between the differential-pressure and the displacement spectra was evaluated. Author

N80-13047*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

ATOMIZING CHARACTERISTICS OF SWIRL CAN COMBUSTOR MODULES WITH SWIRL BLAST FUEL INJECTORS

Robert D. Ingebo 1980 11 p refs Presented at the 25th Annual Intern. Gas Turbine Conf., New Orleans, 9-13 Mar. 1980; sponsored by ASME

(NASA-TM-79297; E-248) Avail: NTIS HC A02/MF A01 CSCL 21E

Cold flow atomization tests of several different designs of swirl can combustor modules were conducted in a 7.6 cm diameter duct at airflow rates (per unit area) of 7.3 to 25.7 g/sq cm sec and water flow rates of 6.3 to 18.9 g/sec. The effect of air and water flow rates on the mean drop size of water sprays produced with the swirl blast fuel injectors were determined. Also, from these data it was possible to determine the effect of design modifications on the atomizing performance of various fuel injector and air swirler configurations. The trend in atomizing performance, as based on the mean drop size, was then compared with the trends in the production of nitrogen oxides obtained in combustion studues with the same swirl can combustors. It was found that the fuel injector design that gave the best combustor performance in terms of a low NOx emission index also gave the best atomizing performance as characterized by a spray of relatively small mean drop diameter. It was also demonstrated that at constant inlet air stream momentum the nitrogen oxides emission index was found to vary inversely with the square of the mean drop diameter of the spray produced by the different swirl blast fuel injectors. Test conditions were inlet air static pressures of 100,000 to 200,000 N/sq m at an inlet air temperature of 293 K. Author

N80-13048*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.

ADVANCED CATALYTIC COMBUSTORS FOR LOW POLLUTANT EMISSIONS, PHASE 1 Final Report

W. J. Dodds Nov. 1979 159 p refs Sponsored in part by Air Force Engineering Services Center, Tyndall AFB, Fla.

(Contract NAS3-20820)

(NASA-CR-159535; CEEDO-TR-79-03) Avail: NTIS HC A08/MF A01 CSCL 21E

The feasibility of employing the known attractive and distinguishing features of catalytic combustion technology to reduce nitric oxide emissions from gas turbine engines during

subsonic, stratospheric cruise operation was investigated. Six conceptual combustor designs employing catalytic combustion were defined and evaluated for their potential to meet specific emissions and performance goals. Based on these evaluations, two parallel-staged, fixed-geometry designs were identified as the most promising concepts. Additional design studies were conducted to produce detailed preliminary designs of these two combustors. Results indicate that cruise nitric oxide emissions can be reduced by an order of magnitude relative to current technology levels by the use of catalytic combustion. Also, these combustors have the potential for operating over the EPA landing-takeoff cycle and at cruise with a low pressure drop, high combustion efficiency and with a very low overall level of emission pollutants. The use of catalytic combustion, however, requires advanced technology generation in order to obtain the time-temperature catalytic reactor performance and durability required for practical aircraft engine combustors. A.R.H.

N80-13049# ARO, Inc., Arnold Air Force Station, Tenn.
EVALUATION OF AIRJET DISTORTION GENERATOR USED TO PRODUCE STEADY-STATE, TOTAL-PRESSURE DISTORTION AT THE INLET OF A GENERAL ELECTRIC F101-GE-100 TURBOFAN ENGINE Final Report, 30 Mar. - 31 May 1978
J. D. Hubble and R. E. Smith AEDC Aug. 1979 90 p refs
(AD-A072743; AEDC-TR-78-73) Avail: NTIS HC A05/MF A01 CSCL 21/5

A performance evaluation of an airjet distortion generator (ADG) system used to produce steady-state, total-pressure distortion at the inlet to a turbine engine was conducted. The capability of the system to duplicate screen-generated, classical and composite patterns and to maintain a constant distortion pattern over a range of airflows is presented. The effect of Reynolds number on the system's capability to match patterns is also investigated. A comparison of the effects of inlet distortion produced by screens to that produced by the airjet distortion generator system on the stability characteristics of the General Electric F101-GE-100 turbofan engine is described. GRA

N80-13050# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
BUILD 2 OF AN ACCELERATED MISSION TEST OF A TF-41 WITH BLOCK 76 HARDWARE Final Report, 2 Aug. - 20 Sep. 1978
Robert J. May, Jr. Jul. 1979 189 p refs
(AD-A073436; AFAPL-TR-79-2063) Avail: NTIS HC A09/MF A01 CSCL 21/5

An accelerated mission test (AMT) of a TF41 (S/N 142163) was conducted in the Air Force Aero Propulsion Laboratory's D Bay Sea-Level Engine Test Facility between 2 August 1978 and 20 September 1978. The primary objective of the test was to evaluate the structural reliability of a series of parts changes known as Block 76 hardware. A two-hundred-sixty-three hour test program was initially planned but only one-hundred-eighty-nine hours were actually completed due to the failure of a first stage high pressure turbine blade. Post-test teardown showed all of the Block 76 hardware to be in good condition. Engine performance deterioration was tracked and an exhaust gas temperature survey was performed and the data analyzed. This report describes the details of the test, including test objectives, approach, instrumentation, facility and results. GRA

N80-13051# Flight Dynamics Research Corp., Van Nuys, Calif.
HIGH SPEED EJECTORS Final Report, Sep. 1977 - Dec. 1978
Morton Alperin and Jiunn-Jenq Wu May 1979 92 p refs
(Contract F33615-77-C-3160)
(AD-A073378; FDRC-3160-12-78; AFFDL-TR-79-3048) Avail: NTIS HC A05/MF A01 CSCL 21/5

The performance of solid and jet-diffuser ejectors in motion in their thrust direction was analyzed under the assumption that all fluids are compressible and have arbitrary properties. Two solutions to the equations representing the laws of mass flow and energy conservation and the momentum theorem were obtained. The solutions were examined and only those regions that were consistent with the Second Law of Thermodynamics were utilized. In these valid regions, three distinct characteristic points were observed, and chosen as criteria for classification of ejector performance. These characteristic points determined which of nine possible ejector configurations provided optimal performance at any given flight and injected gas conditions. Detailed examination of the thermodynamic cycle was made for representative cases and data was presented to illustrate the influence of ejectors upon conventional gas generator performance. The influence of nozzle loss, skin friction and flow separation, incomplete kinetic and thermal mixing, and boundary layer ingestion were taken into consideration in the analysis. Correlation with existing stationary solid and jet-diffuser ejector experiments showed excellent agreement between theory and experiment. It has been shown that ejectors designed according to the methods described, can provide large improvement in propulsion system performance throughout the entire practical flight regime. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N80-13052*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF RELAXED STATIC LONGITUDINAL STABILITY ON A SINGLE-STAGE-TO-ORBIT VEHICLE DESIGN
Delma C. Freeman, Jr. and Alan W. Wilhite Washington Dec. 1979 138 p refs
(NASA-TP-1594; L-13243) Avail: NTIS HC A07/MF A01 CSCL 22B

The effects of relaxing longitudinal stability requirements on single stage to orbit space vehicles is studied. A comparison of the mass and performance characteristics of two vehicles, one designed for positive levels of longitudinal stability and the other designed with relaxed stability requirements in a computer aided design process is presented. Both vehicles, required to meet the same mission characteristics are described. Wind tunnel tests, conducted over a Mach number range from 0.3 to 4.63 to verify estimated aerodynamic characteristics, are discussed. A.W.H.

N80-13053*# Honeywell, Inc., Minneapolis, Minn.
ACTIVE FLUTTER CONTROL FOR FLEXIBLE VEHICLES, VOLUME 1 Final Report
J. K. Mahesh, W. L. Garrard, C. R. Stones, and P. D. Hausman Nov. 1979 78 p refs
(Contract NAS1-15486)
(NASA-CR-159160) Avail: NTIS HC A05/MF A01 CSCL 01C

An active flutter control methodology based on linear quadratic gaussian theory and its application to the control of a super critical wing is presented. Results of control surface and sensor position optimization are discussed. Both frequency response matching and residualization used to obtain practical flutter controllers are examined. The development of algorithms and computer programs for flutter modeling and active control design procedures is reported. A.W.H.

N80-13054# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
DIGITAL LOAD CONTROL APPLIED TO FULL-SCALE AIRFRAME FATIGUE TESTS Final Report, Jan. 1976 - Jun. 1977
Nirmal K. Mondol and Richard M. Potter May 1979 175 p refs
(AD-A073588; AFFDL-TR-79-3011) Avail: NTIS HC A08/MF A01 CSCL 01/3

The modeling, analysis and digital simulation of an analog servo controller and its successful application to a full-scale airframe fatigue tests is described. Primary emphasis is on the use of minicomputers for dynamic load control of multiple channels. Hardware and software used to generate functions and control load is described. A brief comparison of digital system performance versus conventional analog controllers is included. GRA

N80-13055# Royal Aircraft Establishment, Farnborough (England).
SOME MEASUREMENTS OF BUFFETING ON AN AEROELASTIC MODEL OF A SLENDER WING AIRCRAFT
D. G. Mabey, C. W. Skingle, and J. C. Copley London HMSO Dec. 1978 24 p refs
(RAE-TM-Struct-942; BR66853) Avail: NTIS HC A02/MF A01

Buffeting tests on an aeroelastic model of a slender wing aircraft at Mach numbers of 0.2 and 0.3 and at low densities, over an angle of incidence range of from 0 to 24 deg were made. In general, the wing root strains resembled those measured previously on an ordinary wind tunnel model, with almost the same shape. The total damping in the first and third symmetric modes was derived from tape records of the wing root strain signal. For both modes, the total damping was almost independent of angle of incidence, even in the region of vortex breakdown. For the first mode the measured aerodynamic damping was reasonably predicted by assuming that the model was a slender delta wing with attached flow. Author (ESA)

N80-13056# Association Aeronautique et Astronautique de France, Paris.
THE DEVELOPMENT OF ACTIVE CONTROL AND ITS APPLICATION TO FLUTTER SUPPRESSORS [RECENTS PROGRES SUR LES CONTROLES ACTIFS APPLIQUES AUX SUPPRESSEURS DE FLOTTEMENT]
R. Destuynder 1979 22 p refs In FRENCH; ENGLISH summary Presented at 15th Colloq. d'Aerodyn. Appl., Marseille, 7-9 Nov. 1978
(AAAF-NT-79-02; ISBN-2-7170-0529-3) Avail: NTIS HC A02/MF A01; CEDOCAR, Paris FF 17 (France and EEC) FF 21 (others)

Wind tunnel tests were performed on an aeroelastic model of a fighter wing mounted on the tunnel wall with different types of stores such as a tank or wing tip stores, in order to investigate the possibility of controling the flutter instabilities by means of the introduction of a control law acting upon wing stiffness. The results of two wind tunnel experiments in the high subsonic flow zone show that a relatively simple law can be used to suppress fluttering with the help of some experimental data. The difficulties introduced in the study of fully automatic control by the interaction between superimposed active control systems are pointed out. Author (ESA)

N80-13307 Indian Inst. of Tech., Kanpur.
SOME RECENT TRENDS IN AIRCRAFT FLUTTER RESEARCH
P. N. Murthy *In* SVIC Shock and Vibration Digest, Vol. 11, No. 5 May 1979 p 7-12 refs (For primary document see N80-13306 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D.C. 20375 CSCL 01/3

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

N80-13057# Federal Aviation Administration, Washington, D. C.
INSTALLATION CRITERIA FOR THE APPROACH LIGHTING SYSTEM IMPROVEMENT PROGRAM (ALSIP) Final Report
Steven Zaidman Nov. 1978 44 p
(AD-A070076; FAA-ASP-78-5) Avail: NTIS HC A03/MF A01 CSCL 01/5

An investment criteria for retrofit of runway approach lighting systems is presented. The retrofit of existing rigid light support structures with frangible mountings and the conversion of high intensity lighting systems to more energy efficient configurations is discussed. The criteria are developed by benefit versus cost analysis. A.W.H.

N80-13058*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
SYNTHESIS OF A CONTROL MODEL FOR A LIQUID NITROGEN COOLED, CLOSED CIRCUIT, CRYOGENIC NITROGEN WIND TUNNEL AND ITS VALIDATION Progress Report, period ending Sep. 1979
S. Balakrishna and G. L. Goglia Nov. 1979 142 p refs
(Grant NsG-1503)
(NASA-CR-162508) Avail: NTIS HC A07/MF A01 CSCL 01E

The details of the efforts to synthesize a control-compatible multivariable model of a liquid nitrogen cooled, gaseous nitrogen operated, closed circuit, cryogenic pressure tunnel are presented. The synthesized model was transformed into a real-time cryogenic tunnel simulator, and this model is validated by comparing the model responses to the actual tunnel responses of the 0.3 m transonic cryogenic tunnel, using the quasi-steady-state and the transient responses of the model and the tunnel. The global nature of the simple, explicit, lumped multivariable model of a closed circuit cryogenic tunnel is demonstrated. M.M.M.

N80-13059# European Space Agency, Paris (France). Inst. fuer Aeroelastik.
INVESTIGATIONS ON UNSTEADY PRESSURE DISTRIBUTION MEASUREMENTS IN ROTATING SYSTEMS
Karl Kienappel (DFVLR, Goettingen, West Ger.) Jan. 1979 49 p refs Transl. into ENGLISH of 'Untersuchung zur Messung instationaerer Druecke in rotierenden Systemen", DFVLR, Goettingen, West Ger. Report DLR-FB-77-43, Aug. 1977 Original report in GERMAN previously announced as N78-31135 Original German report available from DFVLR, Cologne DM 23.80
(ESA-TT-503-Rev; DLR-FB-77-43) Avail: NTIS HC A03/MF A01

The theoretical basic requirements for measuring unsteady periodical pressure distributions in a rotating system are discussed. An experimental test set-up to investigate the problems of the measurement technology is described. First results of this experiment made in a 3 m wind tunnel are presented and discussed. Author (ESA)

N80-13060# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aerolastik.
INDUSTRIAL TRIAL RUN OF THE AVA DERIVATIVE BALANCE ON AN ALPHAJET JET MODEL IN A 3 m WINDTUNNEL Final Report
Eberhard Schmidt Bonn Bundesmin. fuer Forsch. u. Technol. Sep. 1978 62 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-W-78-07) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13.05

As part of a project to study stability derivative measurements in wind tunnels, a multicomponent derivative balance was given a trial run in a low speed wind tunnel. For the purpose of determining the servicability and reliability of this apparatus, a light weight model of the Alpha jet was used on which independant derivative measurements had already been performed. The comparison of results shows that this instrument for measuring dynamic stability derivatives on airplane and missile models in combined longitudinal or lateral motions performs adequately. Author (ESA)

N80-13061# National Engineering Lab., East Kilbride (Scotland). Flow Measurement Div.
AIR FLOW MEASUREMENTS IN A LARGE IRREGULARLY SHAPED TUNNEL USING ANEMOMETER AND PITOT-STATIC TUBE TRAVERSE
A. McHugh, F. C. Kinghorn (Natl. Coal Board, Bretby, U.K.), J. Allan (Natl. Coal Board, Doncaster, U.K.), and B. Webster Oct. 1978 25 p refs Sponsored by Metrology and Std. Requirements Board
(NEL-660) Avail: NTIS HC A02/MF A01

A series of traverses using anemometers and pitot tubes to measure the flow rate of air through an explosion gallery were

carried out. Flow rates were also measured using a conical inlet fitted at the gallery outlet. Good agreement was found between the flow rates measured by the individual traverses, but these invariably gave a lower flow rate than the conical inlet, the average difference being about 6%. No definite explanation for this could be found, but conditions in the gallery could possibly cause the inlet to be read in error, although it did not show in subsequent scale model tests. Several methods of traversing the gallery were then used and a system for locating the measuring positions in such irregularly shaped ducts is proposed; these methods did not produce significantly different results, except for a 'continuously sweeping' method which gave flow rates higher than the others by about 2%. In an auxiliary study, it was shown that, unless great care is taken, serious errors can arise in anemometer calibrations. Author (ESA)

N80-13062# Royal Aircraft Establishment, Farnborough (England).
THE ACOUSTIC CHARACTERISTICS OF THE RAE 1.5m WIND TUNNEL
W. J. G. Trebble London HMSO Jan. 1979 50 p refs
(RAE-TR-79002; RAE-Aero-3447; BR67864) Avail: NTIS HC A03/MF A01

Extensive modifications to the old 5 ft tunnel at RAE have provided an acoustic tunnel capable of airspeeds up to 60 m/sec. The drive-fan was replaced by a seven-bladed unit which is now mounted in the return circuit and acoustic splitters were installed in the circuit on both sides of the fan. An anechoic chamber lined with polyether foam was built around the test section to give good acoustic properties at frequencies above 1 kHz. The tunnel background noises level was reduced by more than 15 dB for frequencies below 5 kHz with less benefit at higher frequencies. Tests show that inside the airstream at 50 m/sec the noise level for third-octave bandwidths now drops from 75 dB at 1 kHz to 70 dB at 20 kHz. The noise level outside the airstream is some 5 to 10 dB quieter. Author (ESA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N80-13063*# Rockwell International Corp., Canoga Park, Calif.
SPACE CONSTRUCTION SYSTEM ANALYSIS. FINAL REVIEW. PART 1: EXECUTIVE SUMMARY
1979 50 p
(Contract NAS9-15718)
(NASA-CR-160286; PD79-18) Avail: NTIS HC A03/MF A01 CSCL 22A

Several large space system projects which would drive out specific requirements for space construction are considered. A data base was developed to provide designers of large systems with convenient systematic access to methods of space construction and associated requirements. The results obtained were applied to technologies other than the study project.
M.M.M.

N80-13064*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
LIFE SCIENCE PAYLOADS PLANNING STUDY INTEGRATION FACILITY SURVEY RESULTS
G. W. Wells, N. E. Brown, and W. G. Nelson Nov. 1976 170 p refs
(Contract NAS9-14589)
(NASA-CR-160390; MDC-G6275) Avail: NTIS HC A08/MF A01 CSCL 22A

The integration facility survey effort described is structured to examine the facility resources needed to conduct life science payload (LSP) integration checkout activities at NASA-JSC. The LSP integration facility operations and functions are defined along with the LSP requirements for facility design. A description of available JSC life science facilities is presented and a comparison of accommodations versus requirements is reported. A.W.H.

N80-13065*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
LIFE SCIENCE PAYLOADS PLANNING STUDY INTEGRATION FACILITY SURVEY: EXECUTIVE SUMMARY
G. W. Wells and N. E. Brown Nov. 1976 42 p refs
(Contract NAS9-14589)
(NASA-CR-160391; MDC-G6579) Avail: NTIS HC A03/MF A01 CSCL 22A

Analyses of proposed life science shuttle era payload operations are discussed. A summary of results from a survey conducted to: (1) examine facility and equipment resources needed for life science payload integration, checkout, test and mission support activities; (2) identify presently available resources; and (3) determine methods by which operational era status may be implemented based on currently available resources, is presented. A.R.H.

N80-13066*# Teledyne Brown Engineering, Huntsville, Ala. Space Programs Div.
OFFICE OF AERONAUTICS AND SPACE TECHNOLOGY PRELIMINARY REQUIREMENTS FOR SPACE SCIENCE AND APPLICATIONS PLATFORM STUDIES Final Report
Nov. 1979 108 p
(Contract NAS8-32711)
(NASA-CR-161346; SP79-MSFC-2391) Avail: NTIS HC A06/MF A01 CSCL 22A

Needs and requirements for a free flying space science and applications platform to host groupings of compatible, extended mission experiments in earth orbit are discussed. A payload model which serves to define a typical set of mission requirements in the form of a descriptive data base is presented along with experiment leval and group level data summarizations and flight schedules. The payload descriptions are grouped by technology into the following categories: communications, materials (long term effect upon), materials technology development, power, sensors, and thermal control. A.W.H.

N80-13067*# Teledyne Brown Engineering, Huntsville, Ala. Space Systems Dept.
GUIDELINES FOR MISSION INTEGRATION, A SUMMARY REPORT
Nov. 1979 118 p
(Contract NAS8-32711)
(NASA-CR-161347; SP79-MSFC-2392) Avail: NTIS HC A06/MF A01 CSCL 22A

Guidelines are presented for instrument/experiment developers concerning hardware design, flight verification, and operations and mission implementation requirements. Interface requirements between the STS and instruments/experiments are defined. Interface constraints and design guidelines are presented along with integrated payload requirements for Spacelab Missions 1, 2, and 3. Interim data are suggested for use during hardware development until more detailed information is developed when a complete mission and an integrated payload system are defined. Safety requirements, flight verificication requirements, and operations procedures are defined. R.E.S.

N80-13068*# Grumman Aerospace Corp., Bethpage, N.Y.
SPACE FABRICATION DEMONSTRATION SYSTEM. COMPOSITE BEAM CAP FABRICATOR DEVELOPMENT, PHASE 1 AND 2 Final Report
30 Nov. 1979 78 p
(Contract NAS8-32472)
(NASA-CR-161348; NSS-SFDS-RP015) Avail: NTIS HC A05/MF A01 CSCL 22A

Pultrusion as a workable process for thermoset and thermoplastic graphite composite closed caps is discussed. The composite beam fabricator configuration is presented as are the beam cap properties. A.W.H.

N80-13069# European Space Agency, Paris (France).
MATERIAL SCIENCES IN SPACE
T. D. Guyenne, ed. and S. Adamy, ed. Jun. 1979 466 p refs Partly in ENGLISH and FRENCH Proc. of lectures presented at 3d European Symp. on Mater. Sci. in Space, Grenoble, France, 24-27 Apr. 1979 Prepared in cooperation with CNES and CEA (ESA-SP-142) Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Materials science technology is assessed especially in regards to spaceborne research and development. Main topics included

phenomena encountered during fluid phases of materials space processing, gravitational and nongravitational (Marangoni) convection, the characteristics of floating zones as well as containerless melts. Recent results on the elaboration of crystal growth techniques, both on Earth and in orbit, are also covered. Preparation for the First Spacelab Payload is extensively discussed. Finally, the outlook for continuing research into spaceborne materials science is considered. For individual titles, see N80-13070 through N80-13125.

N80-13070# Academy of Sciences (USSR), Moscow. Inst. of Science Research.
THE MULTIPURPOSE APPARATUS CRYSTAL FOR PROCESS EXPERIMENTS IN SPACE **c35**
A. Yu. Malinin, R. Z. Sagdeev, V. T. Khryapov, E. T. Solomin, V. I. Seliverstov, Yu. M. Zhelanni, A. F. Podolinni, and D. V. Bocharov *In* ESA Mater. Sci. in Space Jun. 1979 p 5-8 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The multipurpose specialized apparatus 'Crystal' was designed for investigations of single crystal and semiconductor layer growth features under near-zero gravitation. Requirements for the specialized apparatus for process experiments onboard space stations, design features, and functional diagrams are discussed. The furnace associated with the system, the computerized control unit, and the data processing equipment are described. Possible applications onboard the Salyut 6 spacecraft, such as directional crystallization, sublimation, gas-carrier transfer, and travelling melt solvent experiments, are cited. Author (ESA)

N80-13071# Academy of Sciences (USSR), Moscow.
STRUCTURAL AND PHYSICAL CHARACTERISTICS OF InSb SINGLE CRYSTALS GROWN UNDER NEAR-ZERO GRAVITY CONDITIONS **c76**
F. R. Khashimov et al *In* ESA Mater. Sci. in Space Jun. 1979 p 9-15 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The results of the first experiments carried in space using the multipurpose apparatus 'Crystal' are reported. The main aim of the experiments was to study the growth features of semiconductor binary compounds (for example InSb) under weightlessness conditions. Furthermore, the influence of these conditions on crystalline perfection and homogeneity of electrophysical properties of crystals and also on impurity microsegregation behavior in grown crystals was studied. For this purpose the crystals were grown under the same temperature conditions on Earth and on board the orbital station Salyut 6.Author (ESA)

N80-13072# Academy of Sciences (USSR), Moscow.
THE INFLUENCE OF SPACE CONDITIONS ON DIRECTIONAL CRYSTALLIZATION OF GERMANIUM AND ITS PROPERTIES **c76**
E. V. Markov et al *In* ESA Mater. Sci. in Space Jun. 1979 p 17-23 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The growth and properties of germanium crystals grown by a directional crystallization technique under near-zero gravity conditions onboard Salyut 6 and crystals grown on Earth using the same growing system (Crystal) were studied. The growth features studied by the surface morphology and properties of the crystals grown under weightlessness conditions were compared with those of the crystals grown on Earth by lateral and longitudinal directional crystallization techniques. The crystals were studied by analytical techniques involving optical and electron scanning microscopy for investigation of growth feature, surface morphology, and crystalline perfection. The homogeneity of electrophysical characteristics was determined by measuring the resistivity and Hall effect. The results obtained confirm the advantages of space conditions for growing semiconductor single crystals by directional crystallization and the possibility of growing the crystals with high structural perfection and chemical homogeneity. Author (ESA)

N80-13073# Academy of Sciences (USSR), Moscow.
CONVECTIVE PROCESSES AT LOW GRAVITY **c34**
V. I. Polezhaev *In* ESA Mater. Sci. in Space Jun. 1979 p 25-31 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Convection under zero gravity conditions is reviewed. Some trends and properties of gravitational convection in weak body force fields and some typical patterns of convective interaction are treated. The results obtained by numerical solutions based on general equations of hydromechanics show that convective effects under weightlessness can be substantial. Author (ESA)

N80-13074# Academy of Sciences (USSR), Moscow.
INVESTIGATION OF THE STRUCTURE OF Te-Se SOLID SOLUTIONS OBTAINED UNDER DIFFERENT GRAVITY CONDITIONS ON BOARD THE SALYUT 6 STATION, IN A CENTRIFUGE **c25**
G. E. Ignatjev (Moscow Inst. of Steel and Alloys), A. S. Okhotin (Moscow Inst. of Steel and Alloys), Yu. S. Avraamov et al *In* ESA Mater. Sci. in Space Jun. 1979 p 33-39 (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The structures of a Te-Se solid solution obtained onboard the Salyut 6 space station and of a similar solution grown on Earth are compared. Both solutions were obtained using a centrifuge the force field of which was 10 g (g = 9.8 m per sec squared). The structures of transverse and longitudinal specimens and of freely crystallized surfaces are given. Photomicrographs and X-ray images of the surfaces are presented. Results indicate that the formation of a dendrite structure which is related to the macroinhomogeneity of the solid solution grown on Earth is suppressed in space processing. Author (ESA)

N80-13075# Academy of Sciences (USSR), Moscow.
CRYSTAL GROWTH FROM THE VAPOR PHASE WITH AN INERT COMPONENT PRESENT **c76**
S. I. Aladiev and A. S. Okhotin *In* ESA Mater. Sci. in Space Jun. 1979 p 41-45 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The rates of crystal growth from the vapor gas medium are investigated. The conditions that are adequate to the growth process of the diffusion zone are discussed. The crystal growth rate is determined by the time elapsed when transporting the substance to the boundary with a phase transition or to the zone of a chemical reaction. It is assumed that both the phase transition and the chemical reaction rate develop rather quickly and are not the limiting stages. Author (ESA)

N80-13076# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
EXPERIMENT SYRENA 1, 2, 3: SPACE PROCESSING OF CdHgTe, CdHgSe AND PbSeTe **c24**
R. R. Galazka (Polish Acad. of Sci.), A. Jedrzejczak (Polish Acad. of Sci.), A. Szczerbakow (Polish Acad. of Sci.), T. Warminski (Polish Acad. of Sci.), J. Bak (Polish Acad. of Sci.), J. Auleytner (Polish Acad. of Sci.), A. S. Okhotin, R. P. Borovikova, I. A. Zubritskij, V. T. Khriapov et al *In* ESA Mater. Sci. in Space Jun. 1979 p 47-51 (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The results of the investigations of materials crystallized onboard the space laboratory Salyut 6 are presented. Three component semiconducting solid solutions (CdTe-HgTe, CdSe-HgSe, and PbSe-PbTe) in the under zero-gravity conditions were crystallized. The homogeneity, crystallographic structure, rate of growth, and the influence of cavitation on crystal growth for CdHgTe solid solution are discussed. The partial results for CdHgSe and PbSeTe mixed crystals are also given. Author (ESA)

N80-13077*# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Metallurgy and Materials Science.
INFLUENCE OF THE SPACE ENVIRONMENT ON SOME MATERIALS PROCESSING PHENOMENA
R. F. Sekerka and S. R. Coriell (NBS, Washington, D.C.) *In* ESA Mater. Sci. in Space Jun. 1979 p 55-65 refs Sponsored by NASA (For primary document see N80-13069 04-12)
(Grants NSF DMR-75-09477; NSF DMR-78-22462)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120 CSCL 22A

The influence of the space environment on materials processing phenomena is studied by applying the principles of physical similarity to a system E on Earth and a system S in

the microgravity environment of space. If these systems can be characterized by a set of dimensionless groups, then they are similar if corresponding members of the set are equal for E and S. Similarity is often impractical or impossible if Q is larger than a few samples. For example, there is a simple law of similarity for an isothermal liquid zone floating between inert solids; however, similarity is lost if the zone becomes nonisothermal. A molten zone during crystal growth is so complex that a complete set cannot be identified with certainty. A second example is double-diffusive convection during unidirectional solidification of a binary alloy. Results show that buoyancy driven fluid dynamical instabilities couple with constitutionally related instabilities quite differently in E and S. Author (ESA)

N80-13078# Polytechnical Univ. of Madrid (Spain).
FLOATING ZONE STABILITY (EXP. 1-ES-331) **c34**
I. DaRiva and I. Martinez *In* ESA Mater. Sci. in Space Jun. 1979 p 67-73 refs Sponsored by Spanish Natl. Comm. for Space Res. (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

An experiment on floating liquid zones to be performed in the first Spacelab flight is presented. In this experiment, a liquid bridge is to be placed between two parallel coaxial disks (in the Fluid Physics Module) and subjected to disturbances in order to check the theoretical predictions about its stability limits and behavior under mechanical inputs (stretching of the zone, filling or removing the liquid, axial vibration, rotation, disalignment, etc.). Several aspects of the research are discussed, such as the relevance of the study, theoretical predictions of the liquid behavior regarding the floating zone stability limits and the expected response to vibrational and rotational disturbances, and ground support experiments using the Plateau technique or the small scale simulation. Instrumental aspects of the experiment include utilization of the Fluid Physics Module and post flight data analysis. Author (ESA)

N80-13079# Freiburg Univ. (West Germany).
PREPARATORY EXPERIMENTS FOR THE GROWTH OF SILICON SINGLE CRYSTALS IN THE MIRROR HEATING FACILITY OF SPACELAB **c76**
A. Eyer and R. Nitsche *In* ESA Mater. Sci. in Space Jun. 1979 p 75-79 refs Sponsored by West Germany Federal Min. for Res. and Technol. (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Single crystals of silicon (up to 12 mm dia and 130 mm length) were grown by the floating zone technique. Radiation heating in a double ellipsoid mirror furnace was employed using halogen lamps as energy sources. The power requirement is 800 W, the pulling speed is in the range of 5 to 10 mm/min, and no rotation is necessary. By adapting the so-called necking process, the reproducible growth of dislocation free crystals became possible. The planned growth experiment for FSLP-mission is described. From comparison of the striation patterns in terrestrial and space crystals it is hoped to elucidate the influence of gravity-driven and Marangoni convection on the growth process. Author (ESA)

N80-13080# Bologna Univ. (Italy). Ist. di Fisica A. Righi.
DISPERSED GASEOUS AND SOLID PHASES IN MOLTEN AND SOLIDIFIED Cu **c26**
L. Castellani, P. Gondi, F. Barbieri, and N. Costa *In* ESA Mater. Sci. in Space Jun. 1979 p 81-87 refs Sponsored by CNR-SAS (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The behavior during melting and solidification in zero gravity of pores and Al2O3 particles in sintered Cu was examined. Large numbers of microbubbles with diameters smaller than 1000 A remain. Depending on the compacting and sintering procedures, specimens with uniform or non-uniform distributions of A1203 particles are obtained. Large numbers of small elementary particles with diameters of approximately 500 A also remain, often associated with microbubbles, in the solid. With reference to the zero gravity conditions, results are discussed by considering the effects of Brownian motion and of settling on coalescence and the interactions of the bubbles and/or particles with the solidification front. Author (ESA)

N80-13081# Fulmer Research Inst. Ltd., Stoke Poges (England).
THE PREPARATION AND STABILITY OF METALLIC EMULSIONS IN A MICROGRAVITY ENVIRONMENT: AN EXPERIMENT FOR THE FIRST SPACELAB PAYLOAD (FSLP) **c26**
P. D. Caton and W. G. Hopkins *In* ESA Mater. Sci. in Space Jun. 1979 p 89-94 refs Sponsored by UK Dept. of Ind. (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The melting and casting of an immiscible alloy system in a microgravity environment, such as will be available on Spacelab, offers the opportunity to prepare a metallic emulsion and to study the relative importance of gravity induced and diffusion controlled growth mechanisms on the stability of such an emulsion. An experiment for the first Spacelab payload (FSLP) is described in which aluminum-lead alloys will be given a variety of heat treatments and their microstructures compared with 1 g reference samples. The experiment will be performed in the multi-user isothermal heating facility which will be incorporated in the materials sciences double rack. Author (ESA)

N80-13082# Bundesanstalt fuer Materialpruefung, Berlin (West Germany).
BRAZING UNDER MICROGRAVITY: TEXUS 2 EXPERIMENT **c37**
N. Philippovich (Vienna Univ.), R. Stickler (Vienna Univ.), K. Frieler (Vienna Univ.), and W. Bathke *In* ESA Mater. Sci. in Space Jun. 1979 p 95-100 refs Sponsored in cooperation with Bundesmin. fuer Forsch. U. Technol. and Austrian Bundesmin. fuer Wiss. U. Forsch. (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

In order to evaluate the effects of microgravity on vacuum brazing and the phenomena involved (i.e. flow of braze metal, joint filling, microstructure), an experiment was performed in the isothermal heating furnace of the TEXUS 2 sounding rocket. The sample, consisting of four Ni-cylinders inserted one inside the other to form a 200 micron cylindrical gap and a 0 to 2000 micron sickle-shaped gap, was brazed with a near eutectic Ag-Cu alloy. This brazing alloy contained a small amount of Li to promote spreading (58 Ag : 39 Cu : 3 Li at pct) and radioactive 110 Ag as a tracer metal. The sample was evaluated by autoradiography and metallographic techniques. This experiment was carried out in preparation of the FSLP-experiment ES 304/ES 305. Author (ESA)

N80-13083# Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).
SKIN TECHNOLOGY
H. Sprenger (MAN Neue Technol.), E. Erben (MAN Neue Technol.), H. Zeilinger (MAN Neue Technol.), and K. Schweitzer *In* ESA Mater. Sci. in Space Jun. 1979 p 101-108 refs (For primary document see N80-13069 04-12)
(Contracts DFVLR-BPT-01-QV-276; DFVLR-BPT-01-QV-447)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The possibility of microstructural improvements by melting and solidification of pre-fabricated parts under microgravity is explored. The process is performed within a thin layer coating (skin) which has been deposited on the surface of the already shaped part on Earth. In space the skin should be able to retain the machined shape during the melting process. Preliminary Earth-based experiments with Al2O3 coated samples of an IN 100 alloy show that skin technology is feasible. This was confirmed by two sounding rocket experiments flown in TEXUS 1 and TEXUS 2 where the samples could be melted and resolidified without the severe deformations observed under the influence of hydrostatic pressure due to gravity. Further experiments are planned for the next TEXUS flights and the first Spacelab payload. Author (ESA)

N80-13084# Fiat Research Center, Turin, Italy.
FABRICATION OF COMPOSITE MATERIALS UNDER LOW GRAVITY (EXPERIMENT ES 310 OF THE FIPST SPACELAB PAYLOAD (FSLP)) [FABRICATION DE MATERIAUX COMPOSITES EN MICROGRAVITE (EXPERIENCE ES 310 DU PREMIER VOL SPACELAB)] **c24**
P. L. Antona *In* ESA Mater. Sci. in Space Jun. 1979 p 109-114 In FRENCH Sponsored by CNR (For primary document see

N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Results relative to the preparation of an experiment on the manufacture of aluminum matrix composite materials, covering various aluminum alloys, are presented. Reduced gravity is the variable and following the first Spacelab flight a comparison will be made between samples prepared on Earth and those prepared in space. The selection of specimen types as well as the development of an experimental specimen rack suited to the study of melting and solidifying Al2O3 steel reinforced sample materials are reported. Author (ESA)

N80-13085# Technische Hogeschool, Delft (Netherlands).
UNIDIRECTIONAL SOLIDIFICATION OF EUTECTIC IRON-CARBON ALLOYS AND THE SEGREGATION OF SULFUR c25
T. Luyendijk and H. Nieswaag *In* ESA Mater. Sci. in Space Jun. 1979 p 115-122 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The experiment ES-325 for FSLP in which eutectic cast iron is unidirectionally solidified in order to study the segregation mechanism of sulphur and the growth process of the graphite is described. The experiment will be performed in the gradient facility of the isothermal heating furnace; four different growth rates will be imposed. The crucible of the specimen will be prepared using skin technology. Under terrestial conditions it appeared that during unidirectional solidification with the normal Bridgman technique, unexpected strong convective currents occur in the sulphur containing alloys. As a result during solidification the sulphur gradient in the remaining liquid is removed. The exact mechanism for this convection is not known. In phosphorus containing alloys the convective currents are much less effective, to a first approximation stirring can be neglected. Author (ESA)

N80-13086# Centro Informazioni Studi Esperienze, Milan (Italy).
UHV-CHAMBER: THEORETICAL BACKGROUND AND FACILITY DEVELOPMENT c35
N. Adorni, G. Ghersini, P. G. Sona, F. Rossitto (Milan Polytech.), and G. Cortelazzi (Control Systems) *In*, ESA Mater. Sci. in Space Jun. 1979 p 125-132 refs Sponsored by CNR (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

A dynamic experiment is discussed on adhesion of metals, the goal of which is the characterization of surface forces and interface energies at the contact between real surfaces and the impulsive probing of transient phenomena associated with the adhesion mechanisms. A small metallic sphere impacts against a metal target, and restitution coefficients, contact times, and time behavior of contact forces are measured as a function of incoming sphere velocity and surface roughness of colliding bodies. Computer simulation indicates that conditions exist in which the colliding bodies stick together. To fulfill these conditions the experiment must be carried out in a micro-g laboratory under ultra high vacuum. The experimental device will be integrated into the Material Science Double Rack of the first Spacelab mission, and is now under construction. Its main characteristics are presented. Author (ESA)

N80-13087# Fiat Research Center, Turin, Italy.
THE FLUID PHYSICS MODULE: A CONTRIBUTION TO MATERIALS SCIENCE AND PHYSICS IN SPACE c34
G. Ceronetti and G. Rovera *In* ESA Mater. Sci. in Space Jun. 1979 p 137-147 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The design concept, technical specifications, and hardware implementation of the fluid physics module (FPM) are reviewed. Some results of functional evaluations, performed on the FPM engineering model, are presented. Finally, the guidelines for a follow-on module, capable of independant operation in a standard Spacelab rack and with improved performances, are outlined. Author (ESA)

N80-13088# Battelle Inst., Frankfurt am Main (West Germany).
POSITIONING AND MIXING INSTRUMENTATION EMPLOYING ELECTROSTATIC AND ACOUSTIC PRINCIPLES c35
E. G. Lierke, W. M. Heide, R. Grossbach, and P. F. Clancy (ESTEC, Noordwijk, Netherlands) *In* ESA Mater. Sci. in Space Jun. 1979 p 149-157 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The implementation of hardware on board Spacelab for the contactless positioning of materials science samples is described. An electrostatic method was chosen as an alternative to other positioning principles. With a tetrahedral configuration of spherical electrodes and on operating voltage of 5 kV multidirectional sample repositioning against 1/10,000 to 1/1000 g can be achieved. Initial hardware was developed ensuring mating compatibility with the Isothermal and the Mirror Heating Facility of Spacelab. A 40 kHz ultrasonic mixer with mating compatibility to the Isothermal Heating Facility is also described. The system can operate at temperatures up to 1500 K and is able to micromechanically homogenize and disperse multicomponent materials with a metallic or nonmetallic fluid matrix prior to solidification. Terrestrially mixed samples demonstrate the potential of the mixer. Author (ESA)

N80-13089# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
A SERVICE SYSTEM FOR MATERIAL SCIENCES EXPERIMENTS ON SPACE SHUTTLE
M. Eyb and H. Siemann *In* ESA Mater. Sci. in Space Jun. 1979 p 159-162 (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

At NASA, a program to fly small self-contained payloads on Space Shuttle, which allows material sciences experiments to be conducted in space at moderate cost, was established. A cylindrical container will be provided to accomodate the experimental device. However, the experimenter has to supply his own service system, which takes over the function of standard laboratory equipment on the ground like power supplies, timers, microprocessors, recorders, etc. Such a system, designed to meet the requirements of the Space Shuttle, which has the flexibility to be adapted to various kinds of material sciences experiments is described. The heart of the system is a central service module which comprises a microprocessor combined with a timer and a tape recorder. This programmable unit can be used for timing, to implement feedback loops for process control, for data acquisition, processing, and storage and to do housekeeping. The central service module has its own power supply and thermal control system using phase change material which allows at least 200 hours of autonomous, mission-independent operation. Author (ESA)

N80-13090# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Bereich fuer Projekttraegerschaften.
PROCESS CHAMBER: PAYLOAD ELEMENT OF THE GERMAN MICROGRAVITY MISSION D 1
K. Gardy *In* ESA Mater. Sci. in Space Jun. 1979 p 163-165 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Three equipment groups of the process chamber double rack are discussed and illustrated: experiment modules, a central diagnostic station, and systems for power, cooling etc. The diagnostic station is especially emphasized. Pictures of two typical experiments practicable in the diagnostic station show how the laboratory equipment works. Author (ESA)

N80-13091# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
FUNCTIONAL PERFORMANCE OF THE ISOTHERMAL HEATING FACILITY FOR THE MATERIAL SCIENCE DOUBLE RACK c35
Joachim E. Geisel and Franz Hugo (Leybold Heraeus) *In* ESA Mater. Sci. in Space Jun. 1979 p 167-176 (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

For the first Spacelab payload, an experiment facility for material science experiments was developed. The material science double rack which includes the isothermal heating facility (IHF) allows for the performance of various melting experiments. The concept design and the performance of the IHF are described. Both static and dynamic behavior are provided for planning of experiment profiles, power consumption, etc. The IHF also provides

the possibility to conduct gradient experiments in the heating chamber. Author (ESA)

N80-13092# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).

EXPERIMENT MODULES AND FACILITIES IN TEXUS 1 AND 2 **c35**

Joachim E. Geisel and Burkhard Franke *In* ESA Mater. Sci. in Space Jun. 1979 p 177-188 (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Four experiment modules, called TEM, were developed for the TEXUS 1 launch. This experiment equipment has been the basis for further experiment modules. The modular concept provides an opportunity to refurbish the apparatus after flight and to modify the experiment equipment in order to adapt it to new experiments. The basic modules contain a multipurpose furnace, a furnace with the possibility for observation, a module for observation of boundary layer convection with Schlieren optics, and a module for electrolysis experiments. An overview of the performance of the modules is given and adaptability for different experiments is shown. Author (ESA)

N80-13093# Centre National d'Etudes Spatiales, Toulouse (France).

A CONTAINER FOR CONDITIONING SPACE EXPERIMENTS **c35**

F. Jamin Changeart and J. Cadars *In* ESA Mater. Sci. in Space Jun. 1979 p 189-199 In FRENCH and ENGLISH (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

A modular facility for scientific and technological experiments requiring protection against pollution and degradation hazards before and after their exposure to space environment is presented. The device was designed for a package of French experiments (FRECOPA) to be flown on the NASA Long Duration Exposure Facility (LDEF). The unit is described, consisting of an airtight canister, a support structure, an opening and closing mechanism, and a electronic control unit. Complete equipment specifications are provided and application of FRECOPA on the LDEF is outlined. Author (ESA)

N80-13094*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

ENGINEERING EVALUATION OF EXISTING SPACE HARDWARE FOR UTILIZATION IN SMALL SELF-CONTAINED PAYLOADS **c18**

P. A. Lovoi (Intern. Tech. Assoc.) and W. Vardaman *In* ESA Mater. Sci. in Space Jun. 1979 p 205-210 refs (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120 CSCL 22B

The NASA small self-contained payload program allows research and development experiments of less than 5 cu ft to be flown in the Orbiter payload bay on a space available basis. Materials processing equipment available from Apollo, Skylab, SPAR, and MEA that include such items as furnaces for metallurgical processing and crystal growth, apparatus for measuring crystallization processes, and electrophoretic separators for cell separation are being offered by NASA through this program. Eighteen items for the self-contained payload program were evaluated and many were found to be suitable. Author (ESA)

N80-13095# Academy of Sciences (USSR), Moscow. Inst. of Space Research.

CZECHOSLOVAKIAN PRELIMINARY PROGRAM OF MATERIAL RESEARCH IN SPACE

C. Barta (Acad. of Sci., Prague), A. Triska (Acad. of Sci., Prague), and A. S. Ochotin *In* ESA Mater. Sci. in Space Jun. 1979 p 213-214 (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The survey of proposals is given which the Czechoslovakian working group for cosmic technology prepared in cooperation with the Soviet Space Research Institute of the Academy of Sciences within the framework of INTERCOSMOS. The proposed themes concern the study of crystal growth and of physical properties of single and polycomponent systems of selected dielectrics and semiconductors, research on semiconducting glassy systems, the study of solidification and physical properties of refractory and bearing alloys and alloys with specific magnetic properties as well as investigation into electromigratic separation of polymers. Author (ESA)

N80-13096# Academy of Sciences (USSR), Moscow. Inst. of Space Research.

EXPERIMENT MORAVA ON BOARD SALYUT 6 **c76**

C. Barta (Acad. of Sci., Prague), J. Trnka (Acad. of Sci., Prague), A. Triska (Acad. of Sci., Prague), V. I. Khrjapov, A. S. Ochotin, and I. A. Zubritskij *In* ESA Mater. Sci. in Space Jun. 1979 p 215-219 refs (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Crystallization of mercurous bromide dissolved in a eutectic melt with mercuric bromide was performed under zero, normal, and elevated gravity. The obtained samples were studied using optical and scanning electron microscopy. The external shape of the ingot solidified under zero gravity differs from the expected one. In contrast to another experiment with lead chloride, in this case, there is a considerable difference in the habitus of mercurous bromide crystals grown under different gravity. A short report is also given on preparations for further cosmic experiments with the eutectic system lead chloride - silver chloride. Under terrestrial conditions a filament structure with light-guiding properties has already been obtained. Author (ESA)

N80-13097# Royal Inst. of Tech., Stockholm (Sweden).

SOLIDIFICATION OF SOME EUTECTIC ALLOYS UNDER MICROGRAVITY CONDITIONS AND AT 1 g **c26**

T. Carlberg *In* ESA Mater. Sci. in Space Jun. 1979 p 221-231 refs Sponsored by Swed. Board for Space Activities (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

A unidirectional solidification of an eutectic Al-Cu alloy was performed on Earth and in space. The fault density was evaluated, but the differences between the samples were less than the statistical errors. Thermal analysis was performed with a eutectic Al-Cu alloy both with and without Al2O3 particles and a method for the estimation of the growth in isothermally solidified samples is presented. Faceted growth of the Al-Al2 Cu eutectic is described. In a space sample with the same alloy the number of nuclei was lower than on Earth. In an eutectic Sn-Zn alloy grown in space a larger amount of the structure was of a normal eutectic type compared with Earth grown samples. In experiments with eutectic Al-Si alloys no structural differences between Earth samples and space samples could be detected. Author (ESA)

N80-13098# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Casting of Metals.

THE INFLUENCE OF MICROGRAVITY ON THE STRUCTURE OF Bi-Zn IMMISCIBLE ALLOYS **c26**

T. Carlberg and H. Fredriksson *In* ESA Mater. Sci. in Space Jun. 1979 p 233-243 refs (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

In the TEXUS 2 project four experiments in the system Bi-Zn with three different Bi contents (8%, 24%, and 38%) were performed. The samples were melted and homogenized above the miscibility gap and one of the samples was cooled with two different cooling rates. All were performed under microgravity. The samples showed different types of structure related to composition. The alloy with 8% Bi showed a dispersion of Bi-rich droplets in a Zn-matrix. The alloys with a larger Bi content showed larger areas of Bi-rich regions in a Zn-matrix together with Bi-rich droplets. The results are compared to other experiments in this field. A preliminary theoretical analysis of the results is also performed. Author (ESA)

N80-13099# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. for Materials Research.

STABILITY OF MULTICOMPONENT MIXTURES UNDER MICROGRAVITY CONDITIONS

H. U. Walter *In* ESA Mater. Sci. in Space Jun. 1979 p 245-253 refs (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

In the TEXUS Project Skylark-7 rockets are employed to provide microgravity conditions over a period of approximately 360 sec during the coasting phase of the rocket flight. Model

experiments to determine the stability of multicomponent mixtures during melting, thermal soak, and solidification under microgravity conditions were carried out during TEXUS 1 and TEXUS 2 flights. The results of the experiments are discussed in terms of possible mechanisms affecting the stability of mixtures under microgravity conditions, which is of importance in view of a variety of scheduled flight experiments having the objective to prepare composite materials. Author (ESA)

N80-13100# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.

PREPARATORY STUDIES FOR AN EXPERIMENT IN DIRECTIONAL SOLIDIFICATION OF IMMISCIBLE Al-In ALLOYS ON BOARD A ROCKET VEHICLE [ETUDES DE BASE PREPARATOIRES DE L'EXPERIENCE DE SOLIDIFICATION DIRIGEE D'ALLANGES IMMISCIBLES Al-In EN FUSEE SONDE] **c26**

C. Potard *In* ESA Mater. Sci. in Space Jun. 1979 p 255-262 refs In FRENCH (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Results of preparatory research relative to a microgravity experiment on the capillary properties of Al-In alloys, the phenomena accompanying, the phase transformations, and on the solidification structures are presented. The main parameters governing the properties of biphase liquids, such as phase boundaries, oversaturation, rate of liquid-liquid transformation, changes in volume associated with phase transformations, and the interphase capillary, characteristics, were determined. Solidification structures were studied on the ground in function of the relative direction of the solidification rate vectors and of gravity. The results are discussed in terms of predicted results from the proposed rocket vehicle experiment. Author (ESA)

N80-13101# Technische Universitaet, Clausthal-Zellerfeld (West Germany). Lehrstuhl fuer Glas und Keramik.

REACTIONS BETWEEN GLASS MELTS **c27**

K. Herr, H. J. Barklage-Hilgefort, and G. H. Frischat *In* ESA Mater. Sci. in Space Jun. 1979 p 263-266 refs Sponsored in cooperation with Bundesmin. fuer Forsch. u. Technol. and DFVLR (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The ion exchange in the quasi binary system Na2O.3SiO2-Rb2O.3SiO2 was chosen as an example to study conditions avoiding influence of convection on diffusion experiments between glass melts during the TEXUS 19 rocket experiment. For comparison with the zero gravity experiment a l gravity reference experiment and capillary experiments were done. At 1160 C the zero gravity rocket experiment provided consistent diffusion coefficients, the l gravity reference experiment and even the capillary experiments failed at temperature > 1000 C. The obtained results allow for planning for Spacelab. Author (ESA)

N80-13102# Technische Univ., Berlin (West Germany). Inst. fuer Nichmetallische Werkstoffe.

FUNDAMENTAL EXPERIMENTS ON INTERFACIAL CONVECTION; PROJECT TEXUS 1 AND 2

Rolf Brueckner *In* ESA Mater. Sci. in Space Jun. 1979 p 267-272 refs Sponsored by Bundesmin. fuer Forsch. u. Technol. (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Three experiments on interfacial convection, performed under microgravity and gravity conditions, are compared. The first experiment was to study the behavior of an induced concentration, the second the effect of thermally induced interfacial convection, both acting locally at an interface. In the third experiment the behavior of material exchange through interfacial convection combined with density instability was studied. Comparison of results obtained under microgravity with those under Earth normal gravity shows similar behavior in the first two cases, but totally different behavior in the third. It is concluded that the interfacial-energetic equalizing processes under microgravity are able to produce remarkable transport actions.
Author (ESA)

N80-13103# Bristol Univ. (England). School of Chemistry.

FUNDAMENTAL AND APPLIED ASPECTS OF FLUID PHYSICS UNDER MICROGRAVITY **c34**

J. M. Haynes *In* ESA Mater. Sci. in Space Jun. 1979 p 275-279 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The gravity dependence of various fluid-physical phenomena are surveyed. The use of the practically weightless environment of orbiting spacecraft, with the possibility of conducting relatively long duration manned operations under these conditions, is emphasized for the study of these phenomena. The influence of gravity on the shape of a fluid's boundary with contiguous fluids is discussed as regards theory. Surface tension effects are shown to dominate. Buoyancy driven convection is also treated. As regards other than gravity driven convection, Marangoni flow is cited. The possible applications of microgravity effects to space manufacturing are reiterated. Author (ESA)

N80-13104# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.

FLOW PHENOMENA IN ROTATING FLOATING ZONES WITH AND WITHOUT MARANGONI CONVECTION **c34**

Ch.-H. Chun and W. Wuest *In* ESA Mater. Sci. in Space Jun. 1979 p 283-288 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The effects of floating zone rotation on flow phenomena with and without Marangoni convection are reported. Single and iso-rotation of the solid boundary of a floating zone are superimposed on the one-toroidal-vortex system of Marangoni convection. Counter and iso-rotation on the two-toroidal-vortex system of Marangoni convection, which may be expected to appear during crystal growth from a floating zone, is also discussed. The transitions of the flow patterns from the Marangoni-convection-dominated flow regime into the rotation-dominated regime were observed using thin-light-cut illumination with a laser. The details of the flow patterns on the meridian plane of the floating zone in the transition regime are discussed. Furthermore, it was verified that the oscillatory instability of Marangoni convection and accordingly, the temperature oscillation of the floating zone are suppressed by the application of iso-rotation. The implication of this effect of rotation may be of significance for the crystal growth process. Author (ESA)

N80-13105# Naples Univ. (Italy).

THERMODYNAMICS AND DYNAMICS OF LINE PHASES **c77**

L. G. Napolitano *In* ESA Mater. Sci. in Space Jun. 1979 p 289-296 refs (For primary document see N80-13069 04-12) (Contract CNR/SAS-77-0061)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The set of field equations are described for the confluence region between three immiscible volume phases modelled as a line-phase L in arbitrary motion and with thermodynamic and dynamic properties. The fluids are uncharged, unpolarized, nonelastic and nonmicro-polar. The crucial assumptions are those implied by a local formulation of the equilibrium thermodynamics of L. The set of equations derived comprises: integral and local forms of line balance equations for a scalar or vectorial extensive property; continuity tangential and normal momentum and energy equations; line entropy production. Features of the linear phenomenological relations for irreversible line diffusion and nonequilibrium exchanges of extensive properties between line and surface phases are discussed. Approximations implied in the simpler models so far used are discussed and commented upon. Results of the present more general theory yield, among other things, a generalization of Newmann equations.
Author (ESA)

N80-13106# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.

RECONSIDERATION OF MACROSEGREGATION DURING NONSTATIONARY SOLIDIFICATION [RECONSIDERATION DE LA MACROSEGREGATION EN SOLIDIFICATION NON STATIONNAIRE] **c25**

J. J. Favier *In* ESA Mater. Sci. in Space Jun. 1979 p 297-305 refs In FRENCH (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Several cases of macrosegregation during directional solidification, influenced by the effects of gravity, are discussed. The analysis of macrosegregation is reviewed, centering on a model

which includes both the establishment of a diffusion barrier at the interface and the increase in the mean concentration in the liquid. This model is applied to solidification in the presence of residual convection, observed on Earth as well as in space. The case of solidification of a sedimentary liquid is also covered. A nonstationary analysis of a Ge-Ga system exhibiting a coupling between transitory thermal and chemical regimes is then presented. Macrosegregation results are interpreted in terms of this analysis. Author (ESA)

N80-13107# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.

NONSTATIONARY ANALYSIS OF THE MACROSEGREGATION DURING THE SOLIDIFICATION IN THE SPACE OF THE SYSTEM Ge-Ga [ANALYSE NON STATIONNAIRE DE LA MACROSEGREGATION PENDANT LA SOLIDIFICATION DANS L'ESPACE DU SYSTEME Ge-Ga] **c76**

J. J. Favier, P. Arragon, E. P. Martin (MIT), and A. F. Witt (MIT) *In* ESA Mater. Sci. in Space 1979 p 306-308 refs In FRENCH (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The redistribution of solutes in the system Ge-Ga solidified under weightlessness conditions was analyzed taking into consideration, in particular, the nonstationary characteristics of the solidification velocity. Experimental data obtained by other authors in a space mission were used. The evolution of the Ga concentration during the solidification is compared with predictions from 3 models, resulting in a better fit for the proposed model. It is concluded that the growing process is controlled by a diffusion mechanism in the liquid before a front moving at increasing velocity. Author (ESA)

N80-13108*# Rensselaer Research Corp., Troy, N. Y. Dept. of Materials Engineering.

CONVECTIVE HEAT TRANSFER DURING DENDRITIC GROWTH **c76**

M. E. Glicksman and Shyh-Chin Huang *In* ESA Mater. Sci. in Space Jun. 1979 p 309-312 refs Sponsored by NASA (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120 CSCL 22A

Axial growth rate measurements were carried out at 17 levels of supercooling between 0.043 C and 2 C, a temperature range in which convection, instead of diffusion, becomes the controlling mechanism of heat transfer in the dentritic growth process. The growth velocity, normalized to that expected for pure diffusive heat transfer, displays a dependence on orientation. The ratio of the observed growth velocity to that for convection-free growth and the coefficients of supercooling are formulated. The dependence of normalized growth rate in supercooling is described for downward growing dendrites. These experimental correlations can be justified theoretically only to a limited extent.
Author (ESA)

N80-13109# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).

SPACE EXPERIMENTS ON CHEMICAL PATTERN FORMATION

A. Bewersdoff *In* ESA Mater. Sci. in Space Jun. 1979 p 313-316 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Under appropriate conditions chemical reaction systems may develop instabilities, comparable to hydrodynamic systems. Coherent behavior, like homogeneous oscillations or spatial patterns, may then appear spontaneously beyond certain thresholds. These phenomena can be sensitive to convection. Microgravity, therefore, offers opportunities for investigations. Experimental evidence for a direct influence of hydromechanic shear on a chemical reaction is given. Objectives for space experiments are then discussed. The concept of a special reaction cell and the main requirements of experiments are presented. Author (ESA)

N80-13110# Little (Arthur D.), Inc., Cambridge, Mass.

EXPERIMENTS ON THE STABILITY OF CONICAL AND CYLINDRICAL LIQUID COLUMNS AT LOW BOND NUMBERS **c34**

A. A. Fowle, C. A. Wang, and P. F. Strong *In* ESA Mater. Sci. in Space Jun. 1979 p 317-325 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

A low Bond number simulation technique was used in conducting a number of experiments to establish the stability limits of cylindrical and conical floating liquid columns under conditions of isorotation, equal counter-rotation, rotation of one-end only, and parallel-axis offset. Tests which establish the conditions for resonance in cylindrical liquid columns perturbed by axial, sinusoidal vibration of one end-face are also reported. All tests were carried out under isothermal conditions with water and silicone fluids of various viscosities. With few exceptions, test data for rotating columns show that the onset of instability is in the C-mode and is correlated very well by a theoretical prediction based on isorotation. The onset of instability for a cylindrical column of silicone fluid having a viscosity 100 times of water under equal counter-rotation and single end-rotation is in the first asymmetric mode. An explanation for the rather surprisingly simple C-mode correlation is provided by the results of flow visualization studies. The data on the resonance of cylindrical columns are correlated very well by a prediction based on theory. Author (ESA)

N80-13111# Justus Liebig-Universitaet, Giessen (West Germany). Inst. fuer Physikalisches.

STEADY AND OSCILLATORY MARANGONI CONVECTION IN FLOATING ZONES UNDER 1g **c34**

D. Schwabe, A. Scharmann, and F. Preisser *In* ESA Mater. Sci. in Space Jun. 1979 p 327-333 refs Sponsored by DFVLR (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Experiments on Marangoni Convection (MC) in floating zones are described. Besides other observations MC was identified by its suppression with a viscous oil layer on the surface. The appearance of steady and oscillatory MC was studied. The critical Marangoni numbers for the onset of oscillations and the oscillation frequency were measured. A model for the oscillatory state of MC is given. Special problems with the geometric and thermal boundary conditions in a floating zone are discussed. Their significance for the appearance of steady and oscillatory MC in $NaNO_3$ zones and real crystal growth is shown in experiments and discussed in terms of aspect ratio, capillary surface motion, interface shape and the involved thermal conductivities, and Prandtl numbers. The need for 1 gravity experiments on MC prior to microgravity experiments, their possibilities and limits are discussed. Author (ESA)

N80-13112# Karlsruhe Univ. (West Germany). Inst. fuer Stroemungslehre und Stroemungsmaschinen.

NUMERICAL AND EXPERIMENTAL SIMULATION OF MICROGRAVITY-CONVECTION

H. Oertel, Jr. *In* ESA Mater. Sci. in Space Jun. 1979 p 335-340 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Time dependent convection within a rectangular box was investigated theoretically and experimentally with respect to applications for material science experiments in a space laboratory. The onset of unsteady convection at different heating rates was calculated using linear stability theory. The results obtained demonstrate that convection needs time for developing; this is a nonlinear effect. Two dimensional calculations were carried out using nonlinear basic equations and an explicit finite difference method. This method was applied simulating the influence of time dependent accelerations on convective heat transfer in a space laboratory. In order to gain an initial concept of the influence of the transient accelerations, principle experiments on Earth were done. To demonstrate time dependent convection in space a self contained payloads experiment was prepared. The preliminary flight facility and the I gravity test experiments are also shown. Author (ESA)

N80-13113# Essen Univ. (West Germany).

MIGRATION OF GAS BUBBLES UNDER VARIOUS FORCE FIELDS IN A MICROGRAVITATIONAL ENVIRONMENT **c34**

J. Siekmann *In* ESA Mater. Sci. in Space Jun. 1979 p 341-347 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The steady translational motion of a single noncondensable

bubble enclosed in a Hele-Shaw cell and subject to the action of buoyancy is investigated theoretically and experimentally. The motion of a bubble in a pure liquid is discussed and the effect of a surface film on the motion of a bubble is studied. The migration of a long bubble between parallel plane plates and the motion of a circular cylindrical bubble are examined. In both cases, the bubble is supposed to adhere to the upper plate of the test apparatus. It is shown that a bubble covered entirely by a layer of impurities dissipates much more energy into the surrounding liquid than a bubble without a surface film. Observations on the motion of a pair of bubbles are described. Author (ESA)

N80-13114# Naples Univ. (Italy).
MARANGONI BOUNDARY LAYERS **c34**
L. G. Napolitano *In* ESA Mater. Sci. in Space Jun. 1979 p 349-358 refs (For primary document see N80-13069 04-12)
(Contract CNR/SAS-77-061)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Marangoni boundary layers are defined and their mathematical modeling dealt with for fluids with a Prandtl number of order one. A first order boundary layer approximation of the volume and surface phase field equations is derived; conditions in which a Marangoni boundary layer is established are determined in terms of the problems data. Possible further simplified forms of the Marangoni boundary layer equations (consequent to the negligibility of buoyancy effects and/or to simplifications in the dynamic Laplace equations) are discussed. A priori criteria for the validity of these simplified field forms are derived. By considering eleven typical liquids having a Prandtl number of order one it is shown that there is a large variety of cases of practical interest, in both Earth or microgravitational environments, for which a boundary layer approximation of surface driven flows (in either full or simplified forms) is applicable. Thus, further theoretical and experimental investigations of the structure of this type of dissipative layer are warranted. Author (ESA)

N80-13115# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.
MARANGONI CONVECTION IN A LIQUID LAYER SUBJECTED TO ROTATION ABOUT A TRANSVERSE AXIS **c34**
G. S. R. Sarma *In* ESA Mater. Sci. in Space Jun. 1979 p 359-362 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The possibilities for controlling surface tension driven convection, anticipated in space experiments involving fluid interfaces, the problem of thermocapillary stability of a thin liquid layer subjected to rotation about a transverse axis is considered. The vital role of the different boundary conditions and the destabilizing character of the long wave disturbances at the fluid-fluid interface are illustrated through typical neutral stability curves based on analytical solutions to the pertinent eigenvalue problem. The results indicate the generally beneficial stabilizing influence of rotation in increasing the stable domain especially at higher wave numbers. Author (ESA)

N80-13116# Clermont-Ferrand Univ. (France). Lab. de Cristallographie et Physique des Milieux Condenses.
RESULTS OF FRENCH EXPERIMENTS ON CRYSTAL GROWTH FROM A VAPOR PHASE CONDUCTED ON THE GROUND AS A PART OF THE SPACE PROGRAM [RESULTATS DES EXPERIENCES FRANCAISES DE CROISSANCE EN PHASE VAPEUR EFFECTUEES AU SOL DANS LE CADRE DES PROJETS SPATAUX] **c76**
R. Cadoret *In* ESA Mater. Sci. in Space Jun. 1979 p 363-367 refs In FRENCH Sponsored by CNES (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Thermodynamic studies of germanium transport by its iodides, a theoretical and experimental study on gas dynamic regimes in function of transport parameters, and an experimental study of the nucleation of mercuric iodide based on classical nucleation theories are reported. A simple classification of these systems, based on possible transport modes, is proposed. Author (ESA)

N80-13117# Stuttgart Univ. (West Germany). Physikalisches Inst.
SOME 3-5-SEMICONDUCTOR CRYSTALS GROWN BY THE TRAVELING-HEATER METHOD **c76**
K. W. Benz and G. Mueller (Erlangen-Nuremberg Univ.) *In* ESA Mater. Sci. in Space Jun. 1979 p 369-373 refs Sponsored by Bundesmin. fuer Forsch. u. Technol. (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

In preparing the experiment ES 323 Traveling Heater Growth of 3-5 compounds for the first Spacelab mission, several traveling heater method growth studies were performed taking GaSb as a model 3-5 semiconductor material. Vertical as well as horizontal growth systems were used. The solution temperature was varied between 420 C and 560 C for the growth of GaSb single crystals. At a 500 C growth temperature, the maximum growth rate of GaSb crystals was determined to be 2.5 + or - 0.5 mm/day. Author (ESA)

N80-13118# Wisconsin Univ., Madison. Dept. of Metallurgical and Mineral Engineering.
SOLIDIFICATION OF HIGHLY UNDERCOOLED LIQUID METALS AND ALLOYS **c26**
J. H. Perepezko, C. Galaup, and D. H. Rasmussen (Clarkson Coll. of Technol., Potsdam, N.Y.) *In* ESA Mater. Sci. in Space Jun. 1979 p 375-383 refs (For primary document see N80-13069 04-12)
(Grant DAAG29-78-G-0157)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The amount of undercooling of liquids, usually restricted by the action of heterogeneous catalysts, is discussed. A useful method of generating high undercooling relies upon the dispersion of a liquid metal sample into a fine droplet form in order to isolate active nucleation catalysts. The maximum undercooling to nucleation for several pure metals was increased to about twice the previous value using this method. The application of the droplet technique in alloys allows an evaluation of the kinetic competition between equilibrium and nonequilibrium structures during solidification. For alloys exhibiting a monotectic reaction, thermal analysis was employed to follow the progress of phase separation in undercooled droplets. Further development of these studies is discussed in terms of the advantages offered by a space environment. Author (ESA)

N80-13119# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
STUDY OF THE INFLUENCE OF GRAVITY ON THE SOLIDIFICATION OF IRREGULAR EUTECTIC ALLOYS [ETUDE DE L'INFLUENCE DE LA GRAVITE SUR LA SOLIDIFICATION DES EUTECTIQUES IRREGULIERS] **c26**
C. Lemaignan *In* ESA Mater. Sci in Space Jun. 1979 p 385-389 refs In FRENCH (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The directional solidification of Ag-Ge eutectic alloys was conducted at rates between 1/50,000 and 3 cm per sec. A metallographic analysis of the structures obtained shows that the coupled growth of the eutectic is governed by the crystal growth mechanisms of germanium. This growth involves a system of different lattice types which vary with the rate of solidification. At slow rates, the lattices are oriented parallel to the vector of gravity. It is suggested that gravity driven convection is responsible for this orientation since the mechanism of nucleation responsible for the lattice structure is not completely understood. The F.S.L.P. experiments 1 ES 312 and 1 ES 317 are expected to provide further data on this problem. Author (ESA)

N80-13120# Chalmers Univ. of Technology, Goteborg (Sweden).
AN EXPERIMENTAL METHOD FOR DETERMINATION OF MASS TRANSPORT IN LIQUID METALS TO BE APPLIED UNDER MICROGRAVITY **c26**
T. Persson *In* ESA Mater. Sci. in Space Jun. 1979 p 391-396 refs Sponsored by Swedish Board for Space Activities (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

An electrochemical method for the determination of diffusion and other transport coefficients in liquid metals is described. The fact that this method is intended for sounding rocket experiments imposes restrictions on the time available for performing an experiment. The basic theory underlying the function

of this device is discussed. Suitable applications of the method are also touched upon. Author (ESA)

N80-13121# British Aerospace Dynamics Group, Bristol (England).
SKYLARK SOUNDING ROCKET FACILITIES FOR MATERIALS SCIENCE EXPERIMENTS
D. J. Brown *In* ESA Mater. Sci. in Space Jun. 1979 p 399-404 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

With the advent of the Space Shuttle in the 1980s many materials scientists are devising experiments which can take advantage of the near zero gravity conditions provided by Spacelab. In order that materials scientists can derive maximum benefit from Spacelab missions the advantages of carrying out preliminary experiments using sounding rockets and Shuttle getaway special payloads are worth serious consideration. Although the time available under microgravity conditions is less than Spacelab, a sounding rocket flight can provide comparable low acceleration levels so making it possible to establish the credibility of experiments at an early stage. The facilities provided by Skylark sounding rocket vehicles and systems that are suitable for material science experiments are described. A proposal to fit a Skylark payload module inside a NASA getaway special container is discussed. Author (ESA)

N80-13122# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
EXPERIMENT PERFORMANCE UNDER ZERO-G USING SMALL SELF-CONTAINED PAYLOADS (SSCP) AND OTHER AUTOMATIC EQUIPMENT
P. Vits and J. Schawer *In* ESA Mater. Sci. in Space Jun. 1979 p 405-410 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Many material science experiments do not need to be manned and can be performed automatically. If the volume of these experiments is below 100 liters a very economic way of performing experiments is by the use of SSCPs. SSCPs are autonomous payloads with certain limitations in volume, weight, energy, and heat dissipation. A concept for the layout of standard mechanical and electronic subsystems is presented and the characteristics of this standard equipment are discussed. Experiments that cannot meet the limitations of SSCPs can be performed on the SL-pallet using the capabilities of the pallet. Such equipment can be an automatic isothermal or gradient heating facility. Several facilities can be combined in a payload cluster on the pallet. Author (ESA)

N80-13123# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Bereich fuer Projekttraegerschaften.
OVERVIEW OF THE FUTURE OF THE TEXUS PROGRAM
D. Faust and B. Deserno *In* ESA Mater. Sci. in Space Jun. 1979 p 411-413 (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

Within the German Spacelab utilization program a preprogram named technological experiments under microgravity (TEXUS) was initiated in 1976. By means of sounding flights an zero gravity exposure of about six minutes is used for a variety of materials science experiments. The main objective of this preprogram was to acquire preliminary results as a basis for the preparation of experiments aboard Spacelab. Two projects were carried out. TEXUS 1, the first complete materials science payload in Western Europe (launched successfully on Dec. 13, 1977), and TEXUS 2, (launched successfully on Nov. 16, 1978) was equipped with substantially refurbished and modified hardware previously flown on TEXUS 1. Planning for further TEXUS missions has started due to the excellent scientific outcome of the TEXUS 1 and 2 missions. The modular concept of the TEXUS payloads allows repeated hardware use as well as the introduction of novel experiment equipment. The original plan to launch many rockets as a Spacelab preprogram exclusively was extended to make TEXUS an accompanying program instead. Author (ESA)

N80-13124# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
PROBLEMS POSED BY THE INTEGRATION OF MATERIALS SCIENCE EXPERIMENTS WITH SPACECRAFT SYSTEMS [PROBLEMES POSES PAR L'INTEGRATION D'EXPERIENCES DE SCIENCE DES MATERIAUX DANS UN VEHICLE SPATIAL]
J. P. Praizey and J. Berthier *In* ESA Mater. Sci. in Space Jun. 1979 p 415-425 refs In FRENCH (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The planning of spaceborne experiments, especially as regards the compatibility of experimental equipment with existing spacecraft systems, is considered. Parameters such as the obtainable reduction in gravity, the duration of favorable experimental conditions, available power, the number of measurements to be made, and safety factors are discussed. The use of onboard furnaces in materials science research is emphasized. It is concluded that only through close cooperation between the researchers and the different space agencies involved can acceptable results be obtained. Author (ESA)

N80-13125# General Accounting Office, Washington, D. C.
THE NEAR-TERM POTENTIAL OF MANUFACTURING IN SPACE
E. Fritts and A. Byroade *In* ESA Mater. Sci. in Space Jun. 1979 p 427-432 (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

The near-term potential of space manufacturing is discussed. Near-term is defined as anytime between now and the year 2000. In response to that request, an overview of the National Aeronautics and Space Administration's materials processing program, a first step toward space manufacturing, is provided. It is presented in nontechnical terms. The views given represent the perspectives of 52 American scientists, economists, and industrialists who contributed to the study. Problems and obstacles that stand in the way of progress are identified, and some alternative courses of action are offered. Author (ESA)

N80-13126# Royal Aircraft Establishment, Farnborough (England).
TABLE OF SPACE VEHICLES: 1973 - 1978
J. A. Pilkington London Feb. 1979 21 p (RAE-TM-Space-271; BR67587) Avail: NTIS HC A02/MF A01

A list of all space vehicles successfully launched between January 1, 1973 and December 31, 1978 is given. Data are presented in tabular form and vehicles are classfied by orbital characteristics. Headings include heliocentric orbits, orbits in the Earth-Moon system, selenocentric orbits (Earth launch), selenocentric orbits (Moon launch), areocentric orbits (Earth launch), and orbits around Venus (Earth launch). Information on vehicle mass, shape, and size as well as brief comments on mission objectives are provided. Author (ESA)

N80-13127# Leitz (Ernst) G.m.b.H., Wetzlar (West Germany).
MANUFACTURING OF OXIDE GLASSES. CRITICAL COMMENT ON PROPOSALS FOR MELTING AND SOLIDIFICATION EXPERIMENTS UNDER ZERO-g CONDITIONS Final Report
Heinz Broemer, Klaus Deutscher, and Emanuel Pfeil Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 42 p refs In GERMAN; ENGLISH summary Prepared in cooperation with Marburg Univ., West Germany
(Contracts BMFT-WRT-1075; DFVLR-01-QV-106)
(BMFT-FB-W-78-06) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8,85

The influence of a containerless melting and solidification process on the crystallization behavior of medium viscous oxide melts is discussed. In spite of the suppression of heterogeneous nucleation, homogeneous nucleation in the melt cannot be absolutely excluded. Experimental results with melts of low viscosity and theoretical considerations admit homogeneous nucleation in a containerless process as a volume and/or surface effect. Therefore modified crystallization behavior cannot be expected under zero-g conditions. The ratio of the cooling rate to nucleation rate in the melt remains crucial for glass formation in space. Author (ESA)

N80-13128# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Unternehmensbereich Raumfahrt.

SYSTEM DEFINITION STUDY FOR A GERMAN CONTRIBUTION TO THE JUPITER ORBITER PROBE PROJECT Final Report
Klaus Bohnhoff Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 44 p In GERMAN; ENGLISH summary
(Contracts BMFT-WRT-1076; DFVLR-01-OO-057A)
(BMFT-FB-W-78-24; MBB-URV-101(77)) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,25

The Retro Propulsion Module and the Pre-Entry Science Package were studied. A more detailed definition of requirements is given along with major concept tradeoff as a basis for the concept definition, an investigation of design alternatives, comparison and preselection of components, an analysis of operation alternatives and characteristics, the identification of necessary preparatory technological work, and preliminary project planning are presented. Author (ESA)

N80-13129# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany). Hauptbereich PRV.
CONCEPT STUDY OF A SHUTTLE-SATELLITE IN CONSIDERATION OF EUROPEAN SATELLITE DEVELOPMENTS AND LAUNCHER SYSTEMS FOR THE 1980'S Final Report
Klaus Mueller Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 100 p refs In GERMAN; ENGLISH summary
(Contracts BMFT-WRT-1076; DFVLR-01-YA-017)
(BMFT-FB-W-78-25) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,80

Development trends in European space programs were analyzed and the results used to define a basic shuttle-satellite configuration. Two options were considered. These are the use of the ARIANE launch vehicle and, alternatively, launch from the space shuttle orbiter. Planned European spaceborne experiments were also taken into account. As a result, two satellite configurations are foreseen as feasible: a shuttle satellite compatible with ARIANE, which means basically a limitation of satellite dimension by the ARIANE fairing constraints, and a specific space shuttle satellite of compact construction and smaller allocated launch costs compared to the shuttle/ARIANE satellite. Both satellites would have a geostationary mass of 700 to 1000 kg and be powered by a 1.5 to 5 kW solar generator. Author (ESA)

N80-13130# Standard Elektrik Lorenz A.G., Stuttgart (West Germany).
FEASIBILITY STUDY WITHIN THE SPACELAB UTILIZATION PROGRAM: COMMON EQUIPMENT, COMMUNICATION/NAVIGATION (COMNAV) Final Report
Georg Herzog, Peter Kreutzer, Tilmann Krieg, Arnim Rappold, and Rolf Stiefel Bonn Bundesmin. Fuer Forsch. u. Technol. Dec. 1978 168 p refs In GERMAN; ENGLISH summary
(Contracts BMFT-WRT-1077; DFVLR-BPT-QV-437)
(BMFT-FB-W-78-36) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 35,30

An equipment module, the COMNAV common equipment, which can be used in different Spacelab missions for experiments in the disciplines of navigation, communications and wave propagation is defined. The proposed equipment consists of antennas, receivers, and signal and data processing equipment. In addition, a test system is included in the design. It is shown that for the proposed, or similar experiment, the usage of common equipment is feasible and cost effective. Author (ESA)

N80-13131# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
APPLICATION OF A TRACKING AND DATA RELAY SATELLITE SYSTEM (TDRSS) TO EUROPEAN REQUIREMENTS Final Report
Wolfgang Gieraths and Hans Martin Braun Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1978 48 p In GERMAN; ENGLISH summary
(Contracts BMFT-WRT-1076; DFVLR-BPT-01-YK-017)
(BMFT-FB-W-78-37) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,80

Around 1981 NASA will phase out that part of its Earth station network that will have up to then served near Earth orbiting spacecraft. It will be replaced by the Tracking and Data Relay Satellite System (TDRSS). NASA offers partial use of the system to nonAmerican users. The consequences of this change over for European beneficiaries of American space facilities are analyzed. Two conceivable alternatives, i.e. two versions of a European Data Relay Satellite, are presented. Their facilities were tailored to the demands of expected European near Earth space activities in the eighties. They are compared for cost and intangibles related to leasing a comparable capability from the TDRS-System. It is shown that this comparison strongly favors one of the proposed European concepts. Author (ESA)

N80-13132# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
THE NUCLEAR AND IONIC CHARGE DISTRIBUTION PARTICLE EXPERIMENTS ON THE ISEE-1 AND ISEE-C SPACECRAFT Final Report
Dietrich Hovestadt, George Gloeckler (Maryland Univ.), Chung Y. Fan (Arizona Univ.), Len. A. Fisk (New Hampshire Univ.), Fred M. Ipavich (Maryland Univ.), Berndt Klecker, Joseph J. Ogallagher (Chicago Univ.), Manfred Scholer, Heinz Arbinger, John Cain (Maryland Univ.) et al Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1978 44 p refs
(Contracts BMFT-WRK-0274; DFVLR-BPT-01-DO-084)
(BMFT-FB-W-78-38) Avail: NTIS HC A03/MF A01; Fachinformationszentrum Energie, Phys., Math., Eggenstein-Leopoldshafen, West Germany DM 9,25

The particle experiments on board ISEE-1 and ISEE-C are described. The instruments were designed to measure the elemental abundances, charge state composition, energy spectra, and angular distributions of energetic ions in the energy range 3 keV/charge to 80 MeV/nucleon, and of electrons between 75 and 1300 keV. The instruments consist of three different sensor systems. These are ULECA, and electrostatic deflection analyzer system (its energy range is 3 to 560 keV/charge), ULEWAT, a double dE/dX versus E thin-window flow-through proportional counter/solid-state detector telescope covering the energy range from 0.2 to 80 MeV/nucleon (Fe), and ULEZEQ, a sensor consisting of a combination electrostatic deflection analyzer and a thin window dE/dX versus E system with a thin-window proportional counter and a position-sensitive solid-state detector (the energy range is 0.3 MeV/nucleon to 6 MeV/nucleon). While the ULECA and the ULEWAT sensors are designed mainly for interplanetary and outer magnetospheric studies, the ULEZEQ sensor also obtains composition data in the trapped radiation zone. Author (ESA)

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N80-13133 California Univ., San Diego.
DELTA-RHO, A SECOND ORDER TRAJECTORY PERTURBATION TECHNIQUE Ph.D. Thesis
Louis Tramonti 1979 247 p
Avail: Univ. Microfilms Order No. 7926705

The Delta-Rho second order trajectory perturbation technique applicable to general trajectory problems was developed and, subsequently, verified for specific cases from the field of astrodynamics. This method can be described as an extension of Encke's perturbation technique to second order and to general problems. Unlike the Encke method, this method requires the definition and storage of a reference trajectory which includes all of the perturbations to be considered. Dissert. Abstr.

N80-13134*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
STAR TRACKER ERROR ANALYSIS: ROLL-TO-PITCH NONORTHOGONALITY
R. W. Corson (McDonnell Douglas Technical Services Co., Inc.) Oct. 1979 14 p refs
(NASA-TM-80835; JSC-16238; Rept-79-FM-43) Avail: NTIS HC A02/MF A01 CSCL 22A

An error analysis is described on an anomaly isolated in the star tracker software line of sight (LOS) rate test. The LOS rate cosine was found to be greater than one in certain cases which implied that either one or both of the star tracker measured

end point unit vectors used to compute the LOS rate cosine had lengths greater than unity. The roll/pitch nonorthogonality matrix in the TNB CL module of the IMU software is examined as the source of error. A.W.H.

N80-13135*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TWO-IMPULSE REORIENTATION OF ASYMMETRIC SPACECRAFT
C. William Martz Washington Dec. 1979 43 p refs
(NASA-TP-1554; L-12921) Avail: NTIS HC A03/MF A01 CSCL 22A

An investigation conducted to determine minimum maneuver costs for attitude reorientation of spacecraft of all possible inertial distribution over a wide range of maneuver angles by use of a two impulse coning method of reorientation is reported. Maneuver cost, proportional to the product of fuel consumed (total impulse) and time expended during a maneuver is discussed. Assumptions included external impulsive control torques, rigid body spacecraft rest-to-rest maneuvers, and no disturbance torques. Results are presented in terms of average cost and standard deviation for various maneuver ranges. Costs of individual reorientations are calculated with the computer program included. A.W.H.

N80-13136# Texas Univ., Austin.
ANALYSIS OF REENTRY VEHICLE TRAJECTORY RECONSTRUCTION AND PARAMETER IDENTIFICATION
J. L. McDowell, B. E. Schutz, and B. D. Tapley 1979 11 p refs Presented at Atmospheric Flight Mech. Conf., Boulder, Colo., 6 Aug. 1979
(Contract EY-76-C-04-0789)
(SAND-79-1365C; CONF-790826-2) Avail: NTIS HC A02/MF A01

An analysis of a method for postflight reconstruction of reentry vehicle states and the identification of associated model parameters using the trajectory analysis program is presented. The present investigation focuses on the extent to which a reduced order dynamical model can be utilized to reconstruct reentry vehicle trajectories and to estimate aerodynamic coefficients from onboard observations of the vehicle motion. The feature of local arc trajectory partitioning is discussed and its application to the reentry vehicle problem is described. Numerical results derived from simulated measurements are presented which illustrate the feasibility of this approach. DOE

N80-13137# Royal Aircraft Establishment, Farnborough (England).
DETERMINATION AND GEOPHYSICAL INTEPRETATION OF THE ORBIT OF CHINA 2 ROCKET (1971-18B)
H. Hiller London HMSO Aug. 1978 49 p refs
(RAE-TR-78107; RAE-Space-557; BR66747) Avail: NTIS HC A03/MF A01

The orbit of China 2 rocket, 1971-18B, was determined at 114 epochs throughout its five year life using the orbit refinement program PROP 6 with more than 7000 radar and optical observations from 83 stations. The rocket passed slowly enough through the resonances 14:1, 29:2, 15:1, and 31:2 to allow lumped geopotential harmonic coefficients to be calculated for each resonance by least squares fittings of theoretical curves to the perturbation free values of inclination and eccentricity. The rotation rate of the upper atmosphere, at heights near 300 km, was estimated from the decrease in orbital inclination and values of 1.15, 1.10, and 1.05 rev/day were obtained between April 1971 and January 1976. From the variation in perigee height, 25 values of density scale height were calculated from April 1971 to decay. A further 1400 observation, made during the final 15 days before decay, were used to determine 15 daily orbits. Analysis of these orbits reveals a very strong west-to-east wind of 240 m/sec at a mean height of 195 km under winter evening conditions and gives daily values of density scale height in the last seven days before decay. Author (ESA)

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N80-13138# General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
CONTROLLING THE CLEAN ROOM ATMOSPHERE
R. F. Meeks 1979 6 p refs Presented at the 19th Ann. Meeting of the Inst. of Environ. Sci., Seattle, 29 Apr. 1979
(Contract EY-76-C-04-0656)
(GEPP-OP-405; CONF-790445-5) Avail: NTIS HC A02/MF A01

Several types of clean rooms commonly in use are described. They include the conventional clean room, the horizontal laminar flow clean room, the vertical laminar flow clean room, and a fourth type that incorporates ideas from the previous types and known as a clean air bench or hood. The origin of contamination and methods for controlling the contamination are discussed. DOE

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N80-13139*# Boeing Aerospace Co., Seattle, Wash. Ballistic Missiles and Space Div.
SOLAR POWER SATELLITE SYSTEM DEFINITION STUDY. VOLUME 1, PHASE 1: EXECUTIVE SUMMARY Final Report
16 Feb. 1979 29 p Sponsored in part by DOE. Prepared in cooperation with Gen. Elec., Fairfield, Conn., Grumman Aerospace Corp., Bethpage, N. Y., Little (Arthur D.), Inc., Cambridge, Mass., and TRW Defense and Space Systems Group., Redondo Beach, Calif. 7 Vol.
(Contract NAS9-15636)
(NASA-CR-160370; D180-25037-1-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 22B

A systems definition study of the solar satellite system (SPS) is presented. The technical feasibility of solar power satellites based on forecasts of technical capability in the various applicable technologies is assessed. The performance, cost, operational characteristics, reliability, and the suitability of SPS's as power generators for typical commercial electricity grids are discussed. The uncertainties inherent in the system characteristics forecasts are assessed. A.W.H.

N80-13140*# Boeing Aerospace Co., Seattle, Wash. Ballistic Missiles and Space Div.
SOLAR POWER SATELLITE SYSTEM DEFINITION STUDY. VOLUME 2, PHASE 1: SYSTEMS ANALYSES TRADEOFFS. Final Report
1 Mar. 1979 554 p Sponsored in part by DOE. Prepared in cooperation with Gen. Elec., Fairfield, Conn., Grumman Aerospace Corp., Bethpage, N. Y., Little (Arthur D.), Inc., Cambridge, Mass. and TRW Defense and Space Systems Group, Redondo Beach, Calif. 7 Vol.
(Contract NAS9-15636)
(NASA-CR-160371; D180-25037-2-Vol-2) Avail: NTIS HC A24/MF A01 CSCL 22B

A systems definition study of the solar power satellite system is presented. The satellite solar energy conversion and microwave power transmission systems are discussed. Space construction and support systems are examined including a series construction and equipment characteristics analysis. Space transportation for the satellite and the ground receiving station are assessed. A.W.H.

N80-13141*# Boeing Aerospace Co., Seattle, Wash. Ballistic Missiles and Space Div.
SOLAR POWER SATELLITE SYSTEM DEFINITION STUDY. VOLUME 3: REFERENCE SYSTEM DESCRIPTION, PHASE 1 Final Report
1 Apr. 1979 362 p Sponsored in part by DOE. Prepared in cooperation with Gen. Elec., Fairfield, Conn., Grumman Aerospace Corp., Bethpage, N. Y., Little (Arthur D.), Inc., Cambridge Mass., and TRW Defense and Space Systems Group, Redondo Beach, Calif. 7 Vol.
(Contract NAS9-15636)
(NASA-CR-160372; D180-25037-3-Vol-3) Avail: NTIS HC A16/MF A01 CSCL 22B

An analysis of the solar power satellite system is presented. The satellite solar energy conversion and microwave power transmission systems are discussed including the structure, power distribution, thermal control, and energy storage. Space construction and support systems are described including the work support facilities and construction equipment. An assessment of the space transportation system for the satellite and the ground receiving station is presented. A.W.H.

N80-13142*# Boeing Aerospace Co., Seattle, Wash. Ballistic Missiles and Space Div.
SOLAR POWER SATELLITE SYSTEM DEFINITION STUDY. VOLUME 4: SILICON SOLAR CELL ANNEALING TEST, PHASE 1 Final Report
Frank Walker Apr. 1979 95 p refs 7 Vol.
(Contract NAS9-15636)
(NASA-CR-160373; D180-25037-4-Vol-4) Avail: NTIS HC A05/MF A01 CSCL 22B

Laser annealing tests were conducted on ten 50 micron cells. Two were control cells that were not irradiated. These showed no loss in output due to exposure to the laser. Two cells were broken in handling. Six cells were successfully tested. All cells tested without breakage showed some recovery. One cell was subjected to two cycles and showed recovery on both cycles. Cells that were moderately degraded appeared to recover more completely than those more severly degraded. Exposure times ranged from two to ten seconds at 500 degrees centigrade. There was some indication that longer exposure was beneficial. R.C.T.

N80-13143*# Boeing Aerospace Co., Seattle, Wash. Ballistic Missiles and Space Div.
SOLAR POWER SATELLITE SYSTEM DEFINITION STUDY. VOLUME 5, PHASE 1: EXECUTIVE SUMMARY Final Briefing
14 Nov. 1979 132 p Sponsored in part by DOE. Prepared in cooperation with Gen. Elec., Fairfield, Conn., Grumman Aerospace Corp., Bethpage, N. Y., Little (Arthur D.), Inc., Cambridge, Mass., TRW Defense and Space Systems Group, Redondo Beach, Calif. 7 Vol.
(Contract NAS9-15636)
(NASA-CR-160374; D180-25037-5-Vol-5) Avail: NTIS HC A07/MF A01 CSCL 22B

An analysis of the solar power satellite system is presented. Performance, cost, and operational characteristics are assessed. The photovoltaic system is described and investigated. Alternative construction concepts are discussed. The structural bay configuration is presented along with the antenna structure options. A.W.H.

N80-13144*# Boeing Aerospace Co., Seattle, Wash. Ballistic Missiles and Space Div.
SOLAR POWER SATELLITE SYSTEM DEFINITION STUDY. VOLUME 6, PHASE 1: SPACE CONSTRUCTION AND TRANSPORTATION Final Briefing
14 Nov. 1979 286 p Sponsored in part by DOE. Prepared in cooperation with Gen. Elec., Fairfield, Conn. Grumman Aerospace Corp., Bethpage, N. Y., Little (Arthur D.), Inc., Cambridge, Mass. and TRW Defense and Space Systems Group, Redondo Beach, Calif. 7 Vol.
(Contract NAS9-15636)
(NASA-CR-160375; D180-25037-6-Vol-6) Avail: NTIS HC A13/MF A01 CSCL 22B

A systems definition study of the solar power satellite is presented. Highlighted are the space construction and space transportation systems. A.W.H.

N80-13145*# Boeing Aerospace Co., Seattle, Wash. Ballistic Missiles and Space Div.
SOLAR POWER SATELLITE SYSTEM DEFINITION STUDY. VOLUME 7, PHASE 1: SPS AND RECTENNA SYSTEMS ANALYSES Final Briefing
14 Nov. 1979 280 p Sponsored in part by DOE Prepared in cooperation with Gen. Elec., Fairfield, Conn., Grumman Aerospace Corp., Bethpage, N. Y., Little (Arthur D.), Inc., Cambridge, Mass., and TRW Defense and Space Systems Group, Redondo Beach, Calif. 7 Vol.
(Contract NAS9-15636)
(NASA-CR-160376; D180-25037-7-Vol-7) Avail: NTIS HC A13/MF A01 CSCL 22B

A systems definition study of the solar power satellite systems is presented. The design and power distribution of the rectenna system is discussed. The communication subsystem and thermal control characteristics are described and a failure analysis performed on the systems is reported. A.W.H.

N80-13146# Royal Aircraft Establishment, Farnborough (England).
THE MIRANDA STAR SENSOR EXPERIMENT
G. W. Brown, P. Haskell, and B. Holloway London HMSO Sep. 1978 71 p refs
(RAE-TR-78112; RAE-Space-558; BR67363) Avail: NTIS HC A04/MF A01

The star sensor experiment in Miranda was investigated to determine the performance of the sensor in orbit and to demonstrate its compatibility with the spacecraft attitude control system when used to track a star. The basic design features of the sensor and the methods used to test and integrate it with the satellite are described. The various attitude control modes that were available in orbit are outlined and the way these were used to acquire and lock the control system onto the selected star is shown. Six successful star locks were achieved on either Canopus or Sirius at roughly one month intervals during the eight month operational lifetime of the satellite. On each of these occasions the control system remained in lock for its full scheduled period of about two days and only unlocked when commanded to do so. Author (ESA)

N80-13147# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Unternehmensbereich Raumfahrt.
STANDARDIZATION OF BOOM SYSTEMS FOR SOUNDING ROCKET EXPERIMENTS Final Report
Hermann Waldmann Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1978 34 p In GERMAN; ENGLISH summary
(Contracts BMFT-WRT-1077; DFVLR-BPT-01-OO-048)
(BMFT-FB-W-78-40) Avail: NTIS HC A03/MF A01; Fachinformationszentrum Karlsruhe, West Germany DM 7.15

Most of the boom systems used up to now were booms specially designed to fulfill the individual experiment requirements of particular sounding rockets. The standardization of boom systems is investigated. The general requirements for boom systems are shown and their fulfillment by several different boom systems is studied. As a result, a boom system is shown which is based on the telescope principle and which fulfills most of the stated requirements, but is, nonetheless, not an optimum solution for all requirements. Author (ESA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

N80-13148*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PARAMETRIC STUDY OF THE ORBITER ROLLOUT USING AN APPROXIMATE SOLUTION
Benjamine J. Garland Nov. 1979 45 p refs
(NASA-TM-80837; JSC-16248; Rept-79-FM-44) Avail: NTIS

HC A03/MF A01 CSCL 22B

An approximate solution to the motion of the Orbiter during rollout is used to perform a parametric study of the rollout distance required by the Orbiter. The study considers the maximum expected dispersions in the landing speed and the touchdown point. These dispersions are assumed to be correlated so that a fast landing occurs before the nominal touchdown point. The maximum rollout distance is required by the maximum landing speed with a 10 knot tailwind and the center of mass at the forward limit of its longitudinal travel. The maximum weight that can be stopped within 15,000 feet on a hot day at Kennedy Space Center is 248,800 pounds. The energy absorbed by the brakes would exceed the limit for reuse of the brakes. Author

N80-13149*# Lockheed Electronics Co., Houston, Tex.
SPACELAB INTERFACE DEVELOPMENT TEST, VOLUME 1, SECTIONS 1-6 Final Report
L. H. Harris Nov. 1979 697 p
(Contract NAS9-15800)
(NASA-CR-160411; JSC-14822; LEC-13067) Avail: NTIS HC A99/MF A01 CSCL 22B

Data recorded during the following tests is presented: pulse coded modulator master unit to Spacelab (S/L) interface, master timing unit to S/L interface, multiplexer-demultiplexer/serial input-output to S/L interface, and special tests. A.R.H.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N80-13150*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A DIGITAL COMPUTER PROGRAM FOR THE DYNAMIC INTERACTION SIMULATION OF CONTROLS AND STRUCTURE (DISCOS). VOLUME 4: SUPPLEMENTARY DOCUMENTATION
Harold P. Frisch Aug. 1979 53 p
(NASA-TM-80546) Avail: NTIS HC A04/MF A01 CSCL 22B

Additions made to the original version of the DISCOS computer programs are presented. They include demonstrations of problems and improved capabilities. Remarks are made pertaining new subroutines. M.M.M.

N80-13151*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
INVESTIGATION OF HIGH FREQUENCY OSCILLATIONS IN THE OV102 ELEVON ACTUATION SUBSYSTEMS USING CONTINUOUS SYSTEM MODELING PROGRAM SIMULATION
W. W. Powell, Sr. Jul. 1979 70 p
(Contract NAS9-15800)
(NASA-CR-160407; JSC-14765; LEC-13230; IN-79-EH-05) Avail: NTIS HC A04/MF A01 CSCL 22B

Two theories emerged as the cause of undesired oscillations at frequencies between 40 and 60 Hz in the Orbiter Vehicle inboard and outboard elevon actuation subsystems during hardware testing. Both the 'hardover feedback' and 'deadspace' theories were examined using continuous system modeling program simulation. Results did not support the 'hardover feedback' theory but showed that deadspace in the torque feedback spring connections to the servospools must be considered to be a possible cause of the oscillations. Further investigation is recommended. A.R.H.

N80-13094*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ENGINEERING EVALUATION OF EXISTING SPACE HARDWARE FOR UTILIZATION IN SMALL SELF-CONTAINED PAYLOADS
P. A. Lovoi (Intern. Tech. Assoc.) and W. Vardaman *In* ESA Mater. Sci. in Space Jun. 1979 p 205-210 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120 CSCL 22B

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

N80-13152*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FLIGHT TECHNOLOGY IMPROVEMENT
Dec. 1979 76 p Proceedings of workshop held at College Park, Md., 31 Jul. - 2 Aug. 1979
(NASA-CP-2101; L-13259) Avail: NTIS HC A05/MF A01 CSCL 22B

Shortcomings in spaceborne instrumentation technology are analyzed and recommendations are given for corrections and technology development. The technologies discussed are optical radiometric instruments and calibration, attitude control and determination, and electromechanical and power subsystems. For individual titles, see N80-13153 through N80-13157.

N80-13153*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SUMMARY OF THE FLIGHT TECHNOLOGY IMPROVEMENT WORKSHOP
In its Flight Technol. Improvement Dec. 1979 p 1-7 (For primary document see N80-13152 04-19)
Avail: NTIS HC A05/MF A01 CSCL 22B

Spaceborne instrumentation technology deficiencies are summarized. Recommendations are given for technology development, improvements in existing technology, and policy changes needed to facilitate the use of improved technology. Optical radiometric instruments, attitude control, and electromechanical and power subsystems are considered. K.L.

N80-13154*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REPORT OF OPTICAL RADIOMETRIC INSTRUMENTS AND CALIBRATION PANEL
In its Flight Technol. Improvement Dec. 1979 p 9-26 (For primary document see N80-13152 04-19)
Avail: NTIS HC A05/MF A01 CSCL 22B

Measurement and accuracy needs for remote sensing are analyzed. Topics discussed include: (1) in orbit performance degradation due to contamination; (2) increased radiometric accuracy required for detecting small changes over long periods of time in environmental parameters; (3) references for verifying calibration in orbit; (4) high attenuation neutral density filters; (5) the sun as a radiation source for testing; (6) rejection of stray light; (7) development of spectrally flat detectors for flight sensors; and (8) long term stability of sensor components. K.L.

N80-13155*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

REPORT OF THE ELECTROMECHANICAL SUBSYSTEMS PANEL
In its Flight Technol. Improvement Dec. 1979 p 27-44 (For primary document see N80-13152 04-19)
Avail: NTIS HC A05/MF A01 CSCL 22B

Deficiencies in electromechanical flight technology are evaluated and development recommendations are made. Specific items discussed include magnetic bearings, lubrication for long life, signal and power transfer devices, servo sensing devices, deployment/retraction devices, cryogenic devices, data storage, and ordnance substitutes. K.L.

N80-13156*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REPORT OF THE POWER SUB SYSTEMS PANEL
In its Flight Technol. Improvement Dec. 1979 p 45-54 (For primary document see N80-13152 04-19)
Avail: NTIS HC A05/MF A01 CSCL 22B

Problems in spacecraft power system design, testing, integration, and operation are identified and solutions are defined. The specific technology development problems discussed include substorm and plasma design data, modeling of the power subsystem and components, power system monitoring and degraded system management, rotary joints for transmission of power and signals, nickel cadmium battery manufacturing and application, on-array power management, high voltage technology, and solar arrays. K.L.

N80-13157*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REPORT OF THE ATTITUDE CONTROL AND ATTITUDE DETERMINATION PANEL
In its Flight Technol. Improvement Dec. 1979 p 55-64 (For primary document see N80-13152 04-19)
Avail: NTIS HC A05/MF A01 CSCL 22B

Failures and deficiencies in flight programs are reviewed and suggestions are made for avoiding them. The technology development problem areas considered are control configured vehicle design, gyros, solid state star sensors, control instrumentation, tolerant/accomodating control systems, large momentum exchange devices, and autonomous rendezvous and docking. K.L.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N80-13158*# Hughes Research Labs., Malibu, Calif.
PRIMARY ELECTRIC PROPULSION TECHNOLOGY STUDY Final Report, 13 Sep. 1977 - 13 Jun. 1979
R. L. Poeschel and J. R. Beattie Nov. 1979 186 p refs
(Contract NAS3-21040)
(NASA-CR-159688) Avail: NTIS HC A09/MF A01 CSCL 01C

An investigation of the 30-cm engineering-model-thruster technology with emphasis placed on the development of models for understanding and predicting the operational characteristics and wear-out mechanisms of the thruster as a function of operating or design parameters is presented. The task studies include: (1) the wear mechanisms and wear rates that determine the useful lifetime of the thruster discharge chamber; (2) cathode lifetime as determined by the depletion of barium from the barium-aluminate-impregnated-porous-tungsten insert that serves as a barium reservoir; (3) accelerator-grid-system technology; (4) a verification of the high-voltage propellant-flow-electrical-isolator design developed under NASA contract NAS3-20395 for operation at 10-kV applied voltage and 10-A equivalent propellant flow with mercury and argon propellants. A model was formulated for predicting performance. M.M.M.

N80-13159*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
Hg ION THRUSTER COMPONENT TESTING
M. A. Mantenieks 1979 15 p refs Presented at 14th Intern. Conf. on Elec. Propulsion, Princeton, N. J., 30 Oct. - 1 Nov. 1979; sponsored by AIAA and DGLR
(NASA-TM-79287; E-230) Avail: NTIS HC A02/MF A01 CSCL 21C

Electron bombardment thrusters, under development to provide both auxiliary and primary propulsion functions for a large variety of space missions are tested. Thruster design verification which requires life tests of durations of the order of the time anticipated in space applications, are discussed. The life time and reliability of an electron bombardment thruster is dependent upon the performance of several critical components including cathodes, vaporizers, and isolators. The performances of the cathode, vaporizer, and propellant isolaters during fatigue analyses are examined. A.W.H.

N80-13160*# Rockwell International Corp., Canoga Park, Calif.
ORBITAL TRANSFER VEHICLE (OTV) ENGINE STUDY. PHASE A: EXTENSION Monthly Progress Report
A. J. Sobin 12 Nov. 1979 12 p
(Contract NAS8-32996)
(NASA-CR-161338; ASR79-116; MPR-2) Avail: NTIS HC A02/MF A01 CSCL 21H

An orbital transfer vehicle OTV engine study program was undertaken to provide additional expander and staged combustion cycle data in the design definition of the OTV engine. The proposed program effort optimizes the expander cycle engine concept (consistent with identified OTV engine requirements), investigates the feasibility of kitting the staged combustion cycle engine to provide extended low thrust operation, and conducts in-depth analysis of development risk, crew safety, and reliability for both cycles. Additional tasks to establish the cost of a 10K thrust expander cycle engine and to render support of OTV systems study contractors are reported. M.M.M.

N80-13161*# Rocketdyne, Canoga Park, Calif.
HIGH-PRESSURE LOX/CH4 INJECTOR PROGRAM Final Report, Oct. 1978 - Sep. 1979
D. B. Wheeler and F. M. Kirby Sep. 1979 94 p refs
(Contract NAS8-33206)
(NASA-CR-161342; RI/RD79-278) Avail: NTIS HC A05/MF A01 CSCL 21H

Two injector types, either coaxial or impinging elements, for high pressure LOX/CH4 operation with an existing 40K chamber are examined. A comparison is presented. The detailed fabrication drawings and supporting analysis are presented. A.W.H.

N80-13162*# Aerojet Liquid Rocket Co., Sacramento, Calif.
DESIGN, FABRICATION AND DELIVERY OF A HIGH PRESSURE LOX-METHANE INJECTOR Final Report
H. W. Valler 15 Nov. 1979 76 p
(Contract NAS8-33205)
(NASA-CR-161343; Rept-33205F) Avail: NTIS HC A05/MF A01 CSCL 21H

An injector for 3000 psia chamber pressure using liquid oxygen and gaseous methane propellants is presented. The injector is intended to be evaluated during a series of pressure-fed test firings using a water-cooled calorimeter chamber and a milled-slot regenerative chamber. Combustion efficiency, combustion stability, ignition and injector face heat transfer assessments were made for candidate injector body and pattern design approaches. This evaluation resulted in baselining an oxidizer post type manifold with a 60 element platelet coaxial swirler injector pattern. An axial acoustic resonator cavity was created at the injector/chamber interface. M.M.M.

N80-13163*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN AND EVALUATION OF HIGH PERFORMANCE ROCKET ENGINE INJECTORS FOR USE WITH HYDROCARBON FUELS
A. J. Pavli 1979 20 p refs Presented at the 16th JANNAF Combustion Conf., Monterey, Calif., 10-14 Sep. 1979
(NASA-TM-79319; E-275) Avail: NTIS HC A02/MF A01 CSCL 21H

The feasibility of using a heavy hydrocarbon fuel as a rocket propellant is examined. A method of predicting performance of a heavy hydrocarbon in terms of vaporization effectiveness is described and compared to other fuels and to experimental test results. Experiments were done at a chamber pressure of 4137 KN/sq M (600 psia) with RP-1, JP-10, and liquefied natural gas as fuels, and liquid oxygen as the oxidizer. Combustion length effects were explored over a range of 21.6 cm (8 1/2 in) to 55.9 cm (22 in). Four injector types were tested, each over a range of mixture ratios. Further configuration modifications were obtained by reaming each injector several times to provide test data over a range of injector pressure drop. J.M.S.

N80-13164*# Tennessee Technological Univ., Cookeville. Dept. of Engineering Science.
ANALYSIS OF COMBUSTION INSTABILITY IN LIQUID FUEL ROCKET MOTORS Ph.D. Thesis
Kin-Wing Wong and M. Ventrice Nov. 1979 119 p refs
(Grant NGR-43-003-015)
(NASA-CR-159733) Avail: NTIS HC A06/MF A01 CSCL 21H

The development of a technique to be used in the solution of nonlinear velocity-sensitive combustion instability problems is described. The orthogonal collocation method was investigated. It found that the results are heavily dependent on the location of the collocation points and characteristics of the equations, so the method was rejected as unreliabile. The Galerkin method, which has proved to be very successful in analysis of the pressure sensitive combustion instability was found to work very well. It was found that the pressure wave forms exhibit a strong second harmonic distortion and a variety of behaviors are possible depending on the nature of the combustion process and the parametric values involved. A one-dimensional model provides further insight into the problem by allowing a comparison of Galerkin solutions with more exact finite-difference computations. A.R.H.

N80-13165*# Tennessee Technological Univ., Cookeville.
STABILITY ANALYSIS OF A LIQUID FUEL ANNULAR COMBUSTION CHAMBER M.S. Thesis
G. H. McDonald Nov. 1978 151 p refs
(Grant NGR-43-003-015)
(NASA-CR-159734) Avail: NTIS HC A08/MF A01 CSCL 21H

High frequency combustion instability problems in a liquid fuel annular combustion chamber are examined. A modified Galerkin method was used to produce a set of modal amplitude equations from the general nonlinear partial differential acoustic wave equation in order to analyze the problem of instability. From these modal amplitude equations, the two variable perturbation method was used to develop a set of approximate equations of a given order of magnitude. These equations were modeled to show the effects of velocity sensitive combustion instabilities by evaluating the effects of certain parameters in the given set of equations. A.W.H.

N80-13166# Naval Research Lab., Washington, D. C. Communications Sciences Div.
A NUMERICAL SOLUTION FOR ROCKET ASCENT TRAJECTORY Final Report
Michael H. Reilly 16 Aug. 1979 67 p refs
(NRL Proj. R04-16)
(AD-A073346; AD-E000314; NRL-MR-4044) Avail: NTIS HC A04/MF A01 CSCL 22/3

A program for the numerical solution of rocket ascent trajectory is presented, which is particularly appropriate for large, multistage, unfinned rocket systems. FORTRAN listings of this program for DEC-10 and PDP-11/70 computer systems are given along with background information, examples, and prescriptions which clarify the usage of the program. Thrust increase and aerodynamic effects are specifically included, and the program is found to be both suitable and efficient for a wide variety of rocket trajectory problems. It is demonstrated how to modify the program results to include Earth's rotation effects. GRA

N80-13167# Los Alamos Scientific Lab., N. Mex.
EFFECTS OF ROCKET EXHAUST PRODUCTS IN THE THERMOSPHERE AND IONOSPHERE
J. Zinn, C. D. Sutherland, and M. B. Pongratz Jul. 1979 23 p refs
(Contract W-7405-eng-36)
(LA-7926-MS) Avail: NTIS HC A02/MF A01

The problem of ionospheric F-layer depletions produced by chemical effects of the exhaust gases from large rockets, with particular emphasis on the heavy lift launch vehicles (HLLV) proposed for use in the construction of solar satellites is examined. A computation of the effects of the Skylab I launch, for which experimental data exist is included. Detailed model computations of HLLV exhaust effects are described. DOE

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N80-13168# Materials Research Labs., Ascot Vale (Australia).
THE PARACHOR AND THE P YIELDS O BOND
Richard G. Gillis and R. Ian Tilley Jan. 1979 18 p refs
(AD-A073410; MRL-TN-418) Avail: NTIS HC A02/MF A01 CSCL 07/4

The bond parachors P (P - O) and P (P to O) have been determined as 21.4 and 17.3 respectively. This result supports the contention that the (P to O) bond in phosphates, phosphonates etc., is a two-electron dative bond and not a four-electron bond. The bond parachors P (P - H), P (P - C), and P (P - C1) have also been determined. GRA

24 COMPOSITE MATERIALS

Includes laminates.

N80-13169 Michigan Univ., Ann Arbor.
FRACTURE TOUGHNESS OF GRAPHITE/EPOXY COMPOSITE LAMINATES ENHANCED BY THE INTERMITTENT INTERLAMINAR BONDING STRENGTH Ph.D. Thesis
Li-Chung Jea 1979 252 p
Avail: Univ. Microfilms Order No. 7925165

The intermittent-interlaminar bond concept was developed and employed to enhance the delamination of graphite/epoxy fiber reinforced composite laminates. A 7-micrometers thick perforated mylar was used to control the interlaminar bonding condition. The mechanism for the pull-out delamination mode of fracture was suggested and the energy consumed in pull-out of the plies was a very important work of fracture contributor to the fracture process. The optimum design conditions for high toughness, high tensile strength CFRP laminates under uniaxial stress are 18 percent interfacial contact and alpha + beta approximately 60 deg. These laminates have a toughness of 600 kJ/squared m which is 380 percent of the toughness of the untreated composite, and retain a tensile strength of 370 MPa and elastic modulus of 60 GPa, compared with 500 MPa and 60 GPa, respectively, for the untreated composite of the same ply lay-up. Dissert. Abstr.

N80-13170*# Lockheed Missiles and Space Co., Palo Alto, Calif.
HYGROTHERMAL DAMAGE MECHANISMS IN GRAPHITE-EPOXY COMPOSITES
Frank W. Crossman, R. Ernest Mauri, and W. John Warren Dec. 1979 156 p refs
(Contract NAS2-9563)
(NASA-CR-3189; LMSC-D626480) Avail: NTIS HC A08/MF A01 CSCL 11D

T300/5209 and T300/5208 graphite epoxy laminates were studied experimentally and analytically in order to: (1) determine the coupling between applied stress, internal residual stress, and moisture sorption kinetics; (2) examine the microscopic damage mechanisms due to hygrothermal cycling; (3) evaluate the effect of absorbed moisture and hygrothermal cycling on inplane shear response; (4) determine the permanent loss of interfacial bond strength after moisture absorption and drying; and (5) evaluate

the three dimensional stress state in laminates under a combination of hygroscopic, thermal, and mechanical loads. Specimens were conditioned to equilibrium moisture content under steady exposure to 55% or 95% RH at 70 C or 93 C. Some specimens were tested subsequent to moisture conditioning and 100 cycles between -54 C and either 70 C or 93 C. K.L.

N80-13171*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IMPROVED FIBER RETENTION BY THE USE OF FILLERS IN GRAPHITE FIBER/RESIN MATRIX COMPOSITES
R. E. Gluyas and K. J. Bowles 1980 12 p refs Proposed for presentation at the 35th Ann. Conf. of the Reinforced Plastics/Composites Inst., New Orleans, 4-8 Feb. 1980; sponsored by Soc. of Plastics Ind.
(NASA-TM-79288; E-231) Avail: NTIS HC A02/MF A01 CSCL 11D

A variety of matrix fillers were tested for their ability to prevent loss of fiber from graphite fiber/PMR polyimide and graphite fiber/epoxy composites in a fire. The fillers tested included powders of boron, boron carbide lime glass, lead glass, and aluminum. Boron was the most effective and prevented any loss of graphite fiber during burning. Mechanical properties of composites containing boron filler were measured and compared to those of composites containing no filler. K.L.

N80-13172# SRI International Corp., Menlo Park, Calif.
PARTICLE IMPACT DAMAGE IN SILICON NITRIDE, PART 3 Annual Report
K. C. Dao, D. A. Shockey, L. Seaman, D. R. Curran, and D. J. Rowcliffe May 1979 116 p refs
(Contract N00014-76-C-0657; SRI Proj. PYU-4928)
(AD-A073570) Avail: NTIS HC A06/MF A01 CSCL 11/2

In the study of fracture in thick silicon nitride plates by particle impact and quasi-static indentation, we used three types of silicon nitride: hot pressed, reaction bonded, and oxidized hot pressed. The fracture damage occurred in well-defined progressive stages. For impact loads or quasi-static indentation loads that do not appreciably exceed the flow stress in the silicon nitride, the elastic radial tensile stresses cause ring and Hertzian cone cracks to form. In the dynamic case, the short duration of the tensile pulse restricts the formation of the ring cracks to the vicinity of the maximum contact radius of the impacting particle. In the quasi-static case, the ring cracks form well outside the maximum contact radius, suggesting that the fracture nucleation and growth kinetics play a significant role in determining the extent of damage. For dynamic loads that exceed the flow stress of the silicon nitride, the plastic flow reduces the tensile radial stress and produces tensile hoop stresses, which in turn, cause radial cracks to form and propagate. At still higher dynamic loads, lateral cracks form. The intersection of these later-stage cracks with the free surface causes material removal (erosion.) GRA

N80-13173# McDonnell-Douglas Research Labs., St. Louis, Mo. Chemical Physics Dept.
MAGNETIC RESONANCE STUDIES OF EPOXY RESINS AND POLYURETHANES Final Report, 3 Feb. 1978 - 3 May 1979
I. M. Brown, A. C. Lind, and T. C. Sandreczki 3 May 1979 111 p refs
(Contract N00019-78-C-0031)
(AD-A073590; MDC-Q0673) Avail: NTIS HC A06/MF A01 CSCL 11/9

Electron paramagnetic resonance (EPR) and proton nuclear magnetic resonance (NMR) have been used to investigate the changes in molecular motions that result in samples of the epoxy resin bisphenol-A diglycidyl ether (DGEBA) cured with diethylene triamine (DETA) and in samples of several polyester polyurethanes subjected to humid environments. The cured epoxy resin is known to show a lowering of the glass transition temperature following water sorption, whereas the polyester polyurethanes undergo hydrolysis and catastrophically depolymerize from rubbery solids to viscous liquids. GRA

N80-13174# Grumman Aerospace Corp., Bethpage, N.Y.
MANUFACTURING COST DATA COLLECTION AND ANALYSIS FOR COMPOSITE PRODUCTION HARDWARE Final Report, Sep. 1977 - Feb. 1979
B. I. Rachowitz, R. J. Coletti, and A. J. Tornabe May 1979 109 p refs
(Contract F33615-77-C-3022; AF Proj. 2401)
(AD-A073507; AFFDL-TR-79-3041) Avail: NTIS HC A06/MF A01 CSCL 11/4

This technical report documents the procedures used to validate the Advanced Composite Cost Estimating Model, by comparing the model output with actual costs measured during production fabrication. This validation also includes recommendations as to the limitations and improvements that can be made to the model. GRA

N80-13175# Syracuse Univ., N. Y. Dept. of Electrical Engineering.
MEASUREMENT OF THE ELECTRICAL PROPERTIES OF COMPOSITE MATERIALS IN THE FREQUENCY RANGE OF DC TO 30 MHz
W. J. Gajda Griffiss AFB RADC Aug. 1979 43 p refs Prepared in cooperation with Notre Dame Univ.
(Contracts F30602-75-C-0121; F30602-78-C-0083; AF Proj. 2338)
(AD-A073638; RADC-TR-79-203) Avail: NTIS HC A03/MF A01 CSCL 11/4

Work reported here is an extension of work reported in RADC-TR-78-156. A much higher conductivity for boron/epoxy is reported using better contacting techniques. For graphite/epoxy: coupled circuit theory is used to relate the conductivity to the measured resistance of a sample; the effect of absorbed moisture on the conductivity is reported; and the effective conductivity of a multiple laminate is reexamined. GRA

N80-13176# Sandia Labs., Albuquerque, N. Mex.
IDENTIFICATION OF THE ELASTIC CONSTANTS FOR COMPOSITES USING MODAL ANALYSIS
T. G. Carne and J. A. Wolf, Jr. (General Motors Res. Labs., Warren, Mich.) Mar. 1979 12 p refs Presented at Spring Meeting of Soc. for Exptl. Stress Anal., San Francisco, 20 May 1979
(Contract DE-AC04-76DP-00789)
(SAND-79-0527C; CONF-790503-5) Avail: NTIS HC A02/MF A01

A procedure is described for determining the elastic constants of isotropic materials based on an impact vibration test of freely supported panels. It is an attractive alternative to currently used techniques because of the ease and speed with which the determinations can be made. This is particularly applicable to fiber-reinforced composites, since the calculations yield average elastic constants rather than those of a small localized specimen of the material. Panels of known metallic materials are evaluated; and the values of their elastic constants are reproduced to within 3% of their reference values. DOE

N80-13177# California Univ., Livermore. Lawrence Livermore Lab.
DEFORMATION AND FAILURE INFORMATION FROM COMPOSITE MATERIALS VIA ACOUSTIC EMISSION
M. A. Hamstad 1 Nov. 1978 32 p refs Presented at 96th Meeting of the Acoust. Soc. of Am., Honolulu, Hawaii, 27 Nov. 1978
(Contract W-7405-eng-48)
(UCRL-81272; CONF-781186-1) Avail: NTIS HC A03/MF A01

Some principles of applying acoustic emission (AE) to the study of fiber-composite materials and structures are reviewed as well as the basics of using AE to monitor the deformation and fracture processes that occur when fiber-composite materials are stressed. New results in some areas of current research interest are presented. The following areas are emphasized; study of couplants for AE testing of composites, evaluation of a special immersion-type AE transducer, and wave propagation complications and the development of techniques for locating AE sources in Kevlar 49/epoxy composite pressure vessels. DOE

N80-13178# General Atomic Co., San Diego, Calif.
PROPERTY CHANGES IN GRAPHITE IRRADIATED AT CHANGING IRRADIATION TEMPERATURE
R. J. Price and G. Hapag (Kernforschungsanlage, Juelich G.m.b.H.,

West Germany) Jul. 1979 42 p refs
(Contract DE-AT03-76ET-35300)
(GA-A-15270) Avail: NTIS HC A03/MF A01

Routine irradiation tests on graphite were carried out at constant temperature and the resulting design data are presented in the form of families of isothermal plots showing the change in property as a function of fast neutron fluence. When service conditions require the irradiation temperature to change, design calculations must use combinations of isothermal plots to predict the graphite properties. Three alternative rules for transposing isothermal curves are discussed: (1) vertical transposition at equal fluence; (2) horizontal transposition at equal property value; and (3) horizontal transposition at scaled fluence. Experimental data from several programs in which the irradiation temperature of graphite specimens was systematically changed were reviewed. Measurements of changes in dimensions, Young's modulus, thermal conductivity, and thermal expansivity are plotted. Overall, the measurements agree well with predictions based on the third transposition rule, whereas the first and second rules sometimes give rise to false predictions or no predictions at all. R.E.S.

N80-13076# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
EXPERIMENT SYRENA 1, 2, 3: SPACE PROCESSING OF CdHgTe, CdHgSe AND PbSeTe
R. R. Galazka (Polish Acad. of Sci.), A. Jedrzejczak (Polish Acad. of Sci.), A. Szczerbakow (Polish Acad. of Sci.), T. Warminski (Polish Acad. of Sci.), J. Bak (Polish Acad. of Sci.), J. Auleytner (Polish Acad. of Sci.), A. S. Okhotin, R. P. Borovikova, I. A. Zubritskij, V. T. Khriapov et al *In* ESA Mater. Sci. in Space Jun. 1979 p 47-51 (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13084# Fiat Research Center, Turin, Italy.
FABRICATION OF COMPOSITE MATERIALS UNDER LOW GRAVITY (EXPERIMENT ES 310 OF THE FIRST SPACELAB PAYLOAD (FSLP)) [FABRICATION DE MATERIAUX COMPOSITES EN MICROGRAVITE (EXPERIENCE ES 310 DU PREMIER VOL SPACELAB)]
P. L. Antona *In* ESA Mater. Sci. in Space Jun. 1979 p 109-114 In FRENCH Sponsored by CNR (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics*.

N80-13179 Case Western Reserve Univ., Cleveland, Ohio.
OXYGEN DIFFUSION IN CLOSE PACKED OXIDES Ph.D. Thesis
Kamjula Pattabhi Rami Reddy 1979 249 p
Avail: Univ. Microfilms Order No. 7924809

Oxygen diffusion in alumina, magnesia, MgAl2O4 spinel, forsterite and hematite was studied by exchanging the samples with an O-18 enriched gas and measuring the O-18 profiles by proton activation analysis. The values of the pre-exponential term and the activation energy for oxygen lattice diffusion in single crystals of these oxides are presented. In close packed oxides there is a good correlation between the oxygen diffusion coefficients and the oxygen density and melting temperature of the oxide. The oxidation rate of Ni-Cr-Al alloys is controlled by oxygen grain boundary diffusion through the alumina scale formed on these alloys. Dissert. Abstr.

N80-13180 Virginia Polytechnic Inst. and State Univ., Blacksburg.
APPLICATION OF SYNTHETIC MOLECULAR SIEVE ZEOLITES AND SILICA GEL TOWARD THE SEPARATION OF SULFUR DIOXIDE FROM COMBUSTION GASES Ph.D. Thesis
George Todd Wright 1979 233 p
Avail: Univ. Microfilms Order No. 7924153

An evaluation of several commercial adsorbents for use as contacting media in a process for combustion gas desulfurization was performed. Sulfur dioxide loadings were greatest for the type 13X molecular sieve followed by AW500 molecular sieve. The effect of gas throughput was minimal which suggests that mass transfer was adsorbent side controlling. As gas temperature increased, sulfur dioxide adsorption decreased linearly for 100 percent sulfur dioxide concentration and nonlinearly for low concentrations (0.003 percent). Application of the molecular sieve adsorbents in a simulated combustion gas for sulfur dioxide removal was superior to several adsorbents for temperature range 21-76 C. However, as gas temperature increases, sulfur dioxide adsorption decreases. No adsorption of sulfur dioxide above 148 C (300 F) could be measured. Dissert. Abstr.

N80-13181 Northwestern Univ., Evanston, Ill.
CATALYST DEACTIVATION AND FIXED BED REACTOR MODELING Ph.D. Thesis
Rustom Billimoria 1979 275 p
Avail: Univ. Microfilms Order No. 7927296

An experimental study with concomitant modeling of the dynamic behavior of a quasi-adiabatic fixed bed catalytic reactor was effected. The model predicted the steady state hydrogenation temperature-distance profile and the deactivation from steady state temperature profiles satisfactorily for all the diluents employed. These simulations put the least strain on the model. Kinetic data were utilized in the region in which they were determined. Problems were encountered in simulating the ignition which imposes a severe stress on the model parameters. These problems are compounded for the metal-diluted systems for which there exists a large dissimilarity between the thermal properties of the active and inert zones. Dissert. Abstr.

N80-13182 Oklahoma State Univ., Stillwater.
TEMPERATURE DEPENDENCE OF THE VISCOSITY OF SOME CRUDE OILS AND PURE LIQUIDS Ph.D. Thesis
Mohamed B. Amin 1979 113 p
Avail: Univ. Microfilms Order No. 7928191

The temperature dependence of viscosity for crude oils and some pure liquids is examined. Correlations between the viscosity-temperature relationships of the liquids considered with certain other physical properties are investigated. The correlations were examined based on the reaction rate theory in order to predict the viscosity of liquids. The experimental viscosity data for the pure liquids were used to test several of the well known empirical models from the literature. The significance of the values of the parameters involved in some of these models was investigated. Dissert. Abstr.

N80-13183 Minnesota Univ., Minneapolis.
OPTICAL REFLECTANCE STUDIES OF ADSORPTION AND REACTION ON PLATINUM Ph.D. Thesis
Raul Alberto Caretta 1979 195 p
Avail: Univ. Microfilms Order No. 7926102

An optical spectrometer was constructed to study adsorption and reaction on polycrystalline platinum ribbons. The changes in reflectivity in the visible region as a function of temperature, wavelength, angle of incidence, and gas composition were examined. Changes in reflectivity upon cyclic exposure to NH3, H2, CO, and N2 and air were examined between 300 K and 1100 K. Simple models were used to interpret reflectivity changes as a function of the surface composition. During NH3 and CO oxidation reactions the delta R/R changes show an extensive etching of the surface able to be measured during the actual process. Etching in oxygen rich mixtures proves to be most damaging to the surface. Changes in concentration of the reactants feed were a accompanied by changes in reflectivity in qualitative agreement with delta R/R changes upon exposure to pure gases. Dissert. Abstr.

N80-13184 Pennsylvania Univ., Philadelphia.
COMPUTATIONAL OF PHYSICAL AND CHEMICAL EQUILIBRIA Ph.D. Thesis
Rajeev Gautam 1979 233 p

Avail: Univ. Microfilms Order No. 7978131

Several methods are reviewed for determining compositions in multiphase, reacting mixtures at equilibrium. Wolfe's quadratic programming algorithm is applied and results compared with the RAND method, NASA method and the George, et al. implementation of Powell's method. A phase-splitting algorithm is described which is coupled with the RAND method to improve its efficiency and reliability in determining the global minimum when the phase distribution is not known at equilibrium or when poor guesses for compositions at equilibrium are available as in process simulators. The RAND method was extended to compute equilibria in electrolytic solutions. Methods for estimating the properties of electrolytic solutions are reviewed, with emphasis on molecule-molecule, molecule-ion and ion-ion interactions. Dissert. Abstr.

N80-13185 Vanderbilt Univ., Nashville, Tenn.
MULTIPLICITY AND STABILITY OF NONADIABATIC HYDROGEN-OXYGEN-NITROGEN FLAMES Ph.D. Thesis
Robert Frederick Heinemann 1979 109 p
Avail: Univ. Microfilms Order No. 7926607

The multiple steady states of the rich hydrogen-oxygen-nitrogen flame were studied theoretically and experimentally. Flame multiplicity and stability is shown to be extremely sensitive to the kinetic mechanism used in the mathematical model of a nonadiabatic hydrogen flame stabilized on a flat flame burner. The model using a complex, seven-step mechanism predicts a thermal ignition temperature of 860 K - approximately 300 K higher than the prediction of the model employing a simpler, four-step mechanism. Results confirm that flat flames are stabilized by losing heat to the burner. As the inlet temperature is lowered, the flames lose less heat, are shifted away from the burner, and approach burn-out. This transition to adiabaticity is explained by the decreased reaction rate of the kinetic mechanism at lower temperatures. It is shown that ignition and burn-out are caused by specific chemical changes in the flame and that the hydrogen radical profile can be used to qualitatively predict the transition from one steady state to another. Dissert. Abstr.

N80-13186 Minnesota Univ., Minneapolis.
SEVERAL ASPECTS OF DYNAMIC BEHAVIOR IN NONLINEAR MATHEMATICAL MODELS OF CHEMICAL REACTION AND DIFFUSION Ph.D. Thesis
Clinton Robert Kennedy 1979 219 p
Avail: Univ. Microfilms Order No. 7926142

The mathematical modeling of chemical systems which exhibit dynamic behavior due to the interaction of chemical reaction and diffusion is described. Topics covered include (1) the structure of solutions to a simple spatially dependent population model involving growth and death; (2) the effect of spatial localization of reaction sites in enzyme reactions; and (3) exotic behavior in a model reaction-diffusion system. Dissert. Abstr.

N80-13187 Wisconsin Univ. - Madison.
OPTIMAL DESIGN OF FLEXIBLE CHEMICAL PROCESSES Ph.D. Thesis
Ranjan Kumar Malik 1979 464 p
Avail: Univ. Microfilms Order No. 7921571

Several techniques are presented based on two-stage design optimization with suitable allowances for uncertain specifications and future changes in economic parameters. Modifications were made to the Constrained Simplex search method in order to optimize noisy objective functions; these improve the computational efficiency of direct solution to the desired here-and-now problem of two-stage formulation. A procedure was developed to obtain conservative but highly flexible designs which are computationally economical. Dissert. Abstr.

N80-13188 Purdue Univ., Lafayette, Ind.
THE WATER SPLITTING LIGHT REACTION OF CHLOROPHYLL a DIHYDRATE. VISIBLE LIGHT SOLAR ENERGY CONVERSION AFTER THE PRIMARY REACTION IN PLANT PHOTOSYNTHESIS Ph.D. Thesis
Lory Galloway 1979 199 p
Avail: Univ. Microfilms Order No. 7926372

The catalysis of water photolysis by chlorophyll a dihydrate is examined. The photophysical and photochemical properties of chlorophyll a dihydrate are contrasted to those of the P700 dimer. It is established that P700 is not capable of catalyzing water photolysis owing to the finding that the dimer possesses a midpoint potential lower than that, required to oxidize water. The role of water on the photochemical activity of chlorophyll a is examined by a study of a photogalvanic cell consisting of a Pt/Chl a photocathode and a Chl a-free Pt anode. The photocurrents are observed to consist of a transient and irreversible component. The irreversible photocurrents are attributed to the photogalvanic splitting of water by chlorophyll a dihydrate. The flux dependence of the photogalvanic response of chlorophyll a dihydrate is analyzed in terms of a biphotonic excitation mechanism for the water splitting reaction. Dissert. Abstr.

N80-13189 Utah Univ., Salt Lake City.
AN ORBITAL LOCALIZATION METHOD AND AN ITERATIVE PROCEDURE FOR CALCULATING NUCLEAR MAGNETIC RESONANCE COUPLING CONSTANTS Ph.D. Thesis
Patrick Kaye Redington 1979 139 p
Avail: Univ. Microfilms Order No. 7927074

A method for obtaining localized orbitals based upon diagonalizing subunits of the density matrix is presented. Semiempirical calculation of nuclear magnetic resonance proton-proton coupling constants is described. Coupling constants are calculated via the mutual polarizability expression using the iterative extended huckel (IEHT) independent electron model. A single excitation configuration is developed and applied using the IEHT wave functions. Using second order perturbation theory, an iterative process which is equivalent to the finite order perturbation theory method is developed. A simple model which gives the coupling constants of the holomethane and haloethylene series as a linear function of the change in bond angle caused by the substitution and the electronegativity of the substituent is derived. Schemes for improving the iterative calculation utilizing localized orbitals are discussed. Dissert. Abstr.

N80-13190 California Univ., San Diego.
STUDIES OF PREMIXED HYDROGEN FLAMES Ph.D. Thesis
Tonru Mitani 1979 357 p
Avail: Univ. Microfilms Order No. 7915639

Propagation of premixed H2-O2-N2 flames near the flammability limit were investigated in order to understand the extinction of premixed flames. A thermal extinction model of two reactant, curved flames is presented using an asymptotic expansion of a large nondimensional activation energy. The preferential diffusions of the two reactants modify the thermal extinction condition of the flames. The model was found to explain the characteristics observed in the quenching of hydrogen-oxygen flames. The heat loss postulated in the analysis was identified to be the convective heat transfer to the cold tube walls. The shift of the flammability limit curves from the constant flame temperature curve can be understood, if the preferential diffusions and incomplete burning of hydrogen caused by the anisotropic flame structure are taken into account. Dissert. Abstr.

N80-13191*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF PRESSURE ON STRUCTURE AND NO SUB X FORMATION IN CO-AIR DIFFUSION FLAMES
Howard G. Maahs and Irvin M. Miller Oct. 1979 58 p refs (NASA-TP-1448; L-12731) Avail: NTIS HC A04/MF A01 CSCL 21B

A study was made of nitric oxide formation in a laminar CO-air diffusion flame over a pressure range from 1 to 50 atm. The carbon monoxide (CO) issued from a 3.06 mm diameter port coaxially into a coflowing stream of air confined within a 20.5 mm diameter chimney. Nitric oxide concentrations from the flame were measured at two carbon monoxide (fuel) flow rates: 73 standard cubic/min and 146 sccm. Comparison of the present data with data in the literature for a methane-air diffusion flame shows that for flames of comparable flame height (8 to 10 mm) and pseudoequivalence ratio (0.162), the molar emission index of a CO-air flame is significantly greater than that of a methane-air flame. M.M.M.

N80-13192*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala. Space Sciences Lab.

SAMPLE STREAM DISTORTION MODELED IN CONTINUOUS-FLOW ELECTROPHORESIS
P. H. Rhodes Aug. 1979 46 p
(NASA-TM-78178) Avail: NTIS HC A03/MF A01 CSCL 07D

Buoyancy-induced disturbances in an electrophoresis-type chamber were investigated. Five tracer streams (latex) were used to visualize the flows while a nine-thermistor array sensed the temperature field. The internal heating to the chamber was provided by a 400 Hz electrical field. Cooling to the chamber was provided on the front and back faces and, in addition, on both chamber side walls. Disturbances to the symmetric base flow in the chamber occurred in the broad plane of the chamber and resulted from the formation of lateral and axial temperature gradients. The effect of these gradients was to retard or increase local flow velocities at different positions in the chamber cross section, which resulted in lateral secondary flows being induced in the broad plane of the chamber. As the adverse temperature gradients increased in magnitude, the critical Rayleigh number was approached and reverse (separated) flow became apparent, which, subsequently, led to the onset of time variant secondary flows. Author

N80-13193*# Tennessee Technological Univ., Cookeville. Dept. of Mechanical Engineering.
AMPLIFICATION OF REYNOLDS NUMBER DEPENDENT PROCESSES BY WAVE DISTORTION Final Report, 1 Jan. 1972 - 31 Oct. 1979
M. Ventrice Nov. 1979 59 p refs
(Grant NGR-43-003-015)
(NASA-CR-159732) Avail: NTIS HC A04/MF A01 CSCL 21B

The amplification of a Reynolds number dependent process by wave distortion and the possibility of applying the results to other similar Reynolds number dependent processes were investigated. The process investigated was that associated with the operation of a constant-temperature hot-wire anemometer. The application of vaporization limited combustion, the type of combustion typically associated with liquid propellant rocket engines, was studied. A series of experiments were carried out to determine the effect of wave distortion on a Reynolds number dependent process and to establish the analogy between the anemometer process and the combustion process. Parametric trends, behavior common to different chamber geometries, and stability boundaries were identified. The results indicate a high degree of similarity between the two processes and the possibility of using the anemometer system to investigate combustion instability. The nonlinear aspects of a Reynolds number dependent process appear to be the dominant mechanisms controlling instability. J.M.S.

N80-13194# Materials Research Labs., Ascot Vale (Australia).
A THERMOGRAVIMETRIC SYSTEM FOR INVESTIGATING GAS-METAL REACTIONS AT ELEVATED TEMPERATURES
Lawrence D. Palmer Oct. 1978 39 p refs
(AD-A073412; MRL-R-726; AR-001-357) Avail: NTIS HC A03/MF A01 CSCL 07/4

This report describes the thermogravimetric system recently established at MRL to study the kinetics of reactions between solids and their gaseous environments at elevated temperatures. Changes in the weight of heated samples, due to reactions such as high-temperature oxidation of metals, are measured by a sensitive, large-capacity electrobalance. The sources of uncertainties in the measurement of both weight and temperature have been considered, and experimental techniques which have been introduced to minimize these uncertainties are discussed. GRA

N80-13195# Wayne State Univ., Detroit, Mich. Research Inst. for Engineering Sciences.
STUDIES OF IONIZATION PROCESSES Final Report, 1 Aug. 1975 - 30 Sep. 1978
Erhard W. Rothe May 1979 23 p refs
(Grant AF-AFOSR-2770-75; AF Proj. 2303)
(AD-A073823; AFOSR-79-0942TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

This is the final report for Grant AFOSR 75-2770. Advances in chemical dynamics are not usually achieved by a single experiment but rather by a blend of informations using a variety of techniques. As a consequence, the results of this research project may be classified in three separate categories: (a) preparation of the experiments with electronically excited atoms and molecules; (b) measurements of kinetic energy thresholds for ion-pair production from molecular collisions, with subsequent derivation of molecular binding energies and electron affinities; and (c) thermal energy chemi-ionization processes. GRA

N80-13196# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
AIRFLOW EFFECTS ON FIRES, PART 2 Final Report, Jun. - Aug. 1976
Thomas Weeks, Charles C. Gebhard, and Gilbert L. Camburn May 1979 70 p refs
(AD-A073486; JTCG/AS-76-T-006) Avail: NTIS HC A04/MF A01 CSCL 21/4

This report expands the knowledge of airflow effects on fuel fires initiated by nonnuclear combat damage obtained from previous work reported in JTCG/AS-T-75-001. An investigation is made into the influence of selected airflow parameters (coefficient of pressure and the boundary layer thickness) upon the blowout velocity for a variety of damage conditions and angles-of-attack. GRA

N80-13197# George Washington Univ., Washington, D. C. School of Engineering and Applied Science.
CHARACTERISTIC PARAMETERS IN COMBUSTION PROCESSES AND THEIR ACCESSIBILITY TO CURRENT AND FUTURE DIAGNOSTICS Progress Report, 1 Mar. 1978 - 31 May 1979
R. Goulard 31 May 1979 43 p refs
(Contract ER-78-S-05-5773)
(ORO-5773-T1) Avail: NTIS HC A03/MF A01

Some of the aspects of combustion diagnostics are presented in order to identify which techniques are best suited to each particular set of experiments. The criteria used for this evaluation is affected by techniques like real time data processing and sensor noise limitations. DOE

N80-13198# Hanford Environmental Health Foundation, Richland, Wash.
EXPERIMENTAL STUDY OF HYDROGEN JET IGNITION AND JET EXTINGUISHMENT
R. W. Wierman Apr. 1979 114 p refs
(Contract EY-76-C-14-2170)
(HEDL-TME-78-80) Avail: NTIS HC A06/MF A01

Two phases are described of an experimental study that investigated: (1) the ignition characteritics of hydrogen-sodium jets; (2) the formation of hydrogen in sodium-humid air atmospheres; and (3) the extinguishment characteristics of burning hydrogen-sodium jets. Test conditions were similar to those postulated for highly-improbable breeder reactor core melt-through accidents and included; jet temperature, jet velocity, jet hydrogen concentration, jet sodium concentration, atmospheric oxygen concentration, and atmospheric water vapor concentration. DOE

N80-13199# Argonne National Lab., Ill.
THERMAL STABILITY AND DECOMPOSITION KINETICS OF AMORPHOUS HYDROGENATED FILMS
J. A. McMillan and E. M. Peterson 1979 13 p refs Presented at Intern. Conf. on Met. Coatings, San Diego, Calif., 23 Apr. 1979
(Contract W-31-109-eng-38)
(CONF-790442-12) Avail: NTIS HC A02/MF A01

The kinetics of decomposition of the equal to SiH2 and identical with SiH centers in amorphous hydrogenated silicon films were studied by thermomanometric analysis. The methods of preparation and analysis are described. Experimental values of the enthalpy and entropy of activation are given in both cases. Tentative reaction mechanisms are proposed on the basis of an interpretation of the results. DOE

N80-13200# Northwestern Univ., Evanston, Ill. Dept. of Mechanical Engineering and Astronautical Sciences.
THEORETICAL STUDIES ON HETEROGENEOUS COMBUSTION Progress Report, 1 Mar. 1978 - 28 Feb. 1979
Chung K. Law 1979 106 p refs

(Contract EG-77-S-02-4433)
(COO-4433-2) Avail: NTIS HC A06/MF A01

Numerical models are developed for unsteady droplet combustion in a reactive environment simulating the fuel spray interior. The classical droplet combustion theory, in which the instanteous rate of fuel vaporization from the droplet is equal to the rate of fuel consumption at the flame, is questioned; a theory is formulated which shows that a significant portion of the fuel vaporized is actually used in filling up the space between the droplet and the flame instead of being consumed at the flame. The effects of possible condensation of ambient moisture on the spary vaporization rate are investigated. DOE

N80-13201# Sandia Labs., Albuquerque, N. Mex.
DEVELOPMENT OF LABORATORY APPARATUS DEDICATED TO THE STUDY OF HYDRIDE-DEHYDRIDE REACTIONS
R. P. Wemple and W. J. Kass Jul. 1979 30 p refs
(Contract EY-76-C-04-0789)
(SAND-78-1803) Avail: NTIS HC A03/MF A01

Hydrogen-compatible laboratory apparatus designed and developed to study hydride-dehydride reactions at elevated pressures and temperatures is described. The system is operated at pressures and temperatures up to 34 MPa and 550 C during experiments conducted on LiAlH4 and NiZr. Instrumentation incorporated into the system also allows differential thermal analysis and acoustic emission data to be collected as the chemical reactions progress is also described. DOE

N80-13202# Sandia Labs., Albuquerque, N. Mex.
QUANTITATIVE GAS ANALYSIS USING FOURIER TRANSFORM INFRARED SPECTROSCOPY
Gary E. Rivord Jul. 1979 27 p refs
(Contract EY-76-C-04-0789)
(SAND-79-0968) Avail: NTIS HC A03/MF A01

Experimental methods were developed for quantitative trace gas analysis using the Nicolet 7199 Fourier transform infrared (FTIR) spectrophotometer. High resolution (0.06/cm full width - half maximum) spectra were obtained for CO and N2O at approximately 1000, 100, and 5 ppM and CO2 at approximately 1000 ppM. These spectra were used to test the quantitative accuracy of the Beer-Lambert relationship and the linearity of the FTIR system. Two methods were used to analyze the spectra. The first involved the measurement of peak height of the maximum spectral feature of the sample compared to that of a known reference spectrum. The second used a computer-assisted method which correlates all the spectral information from the trace gas sample with that of a high signal-to-noise reference spectrum of the gas. A complete description of the spectral correlation method along with the computer program listing is presented. DOE

N80-13203# SRI International Corp., Arlington, Va.
LASER INDUCED PHOTOCHEMISTRY
W. Happer, J. Chamberlain, H. Foley, N. Fortson, J. Katz, R. Novick, M. Ruderman, and K. Watson Feb. 1979 39 p refs
(Contract EY-76-C-03-0115)
(SAN-115/136-1) Avail: NTIS HC A03/MF A01

The merits of lasers as applied to photochemistry in industry along with differences between conventional light sources and lasers are pointed out. The economic aspects remain the main problem facing this project. DOE

N80-13204# Sandia Labs., Albuquerque, N. Mex. Combustion Physics Div.
CARBON DIOXIDE CONCENTRATION AND TEMPERATURE IN FLAMES MEASURED BY RAMAN SPECTROSCOPY
R. J. Blint (Gen. Motors Res. Labs., Warren, Mich.), D. A. Stephenson, and J. H. Bechtel (Gen. Motors Res. Labs., Warren, Mich.) May 1979 21 p refs Presented at Spring Meeting on Western States Sect., and the Combust. Inst., Provo, Utah, 23 Apr. 1979
(Contract EY-76-C-04-0789)
(SAND-79-8612; CONF-790434-5) Avail: NTIS HC A02/MF A01

The high temperature spectrum of CO2 is adequately described by the formalism of Courtoy, including his assignments of the degeneratively split levels. It was concluded that: (1) vibrational levels up to v sub l = 5 and l = 7 must be included to adequately describe the high temperature spectra; (2) the peaks above 1409/cm move in position as a function of thermal population; and (3) gas temperatures obtained from the Raman spectra of CO2 are in agreement with, but less accurate than those obtained from the N2 spectrum. DOE

N80-13205# Argonne National Lab., Ill. Chemical Engineering Div.
MEMBRANE OXYGEN ENRICHMENT COST AND APPLICATION EVALUATION
Jack Fischer and Lowell J. Burnett Mar. 1979 62 p refs
(Contract W-31-109-eng-38)
(ANL-78-108) Avail: NTIS HC A04/MF A01

Composite membranes that are both thin enough to provide a large gas flow and strong enough to withstand the driving pressure of the incoming gas are made by depositing a polymer on the finely porous surface of a fabric-reinforced supporting membrane. The resulting material is then formed into a spiral-wound element that provides a large amount of membrane area in a small volume. The technical feasibility of using such membranes to produce oxygen-enriched air was established. A preliminary analysis of membrane oxygen enrichment economics shows that oxygen enrichment could be profitable for combustion systems up to 100 tons of oxygen per day. A supporting economic study reaffirms the positive economics potential for a 1000 ton/d, 30% O2 enrichment plant. DOE

N80-13206# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
PHOTOCHEMISTRY OF DINITROGEN PENTOXIDE Ph.D. Thesis
Peter Steele Connell May 1979 164 p refs
(Contract W-7405-eng-48)
(LBL-9034) Avail: NTIS HC A08/MF A01

The gas phase photochemistry and thermal decomposition kinetics of dinitrogen pentoxide, N2O5 were examined. The products of photodecomposition and the quantum yield as a function of pressure were determined at a wavelength of 254 nm. The rate of thermal decomposition of N2O5 in the presence of excess NO were observed between 4 x 10 to the 14th power to 2.8 x 10 to the 19th power molecules/cubic cm and 262 to 307 K. The infrared absorptions of N2O5, NO2, and HNO3 were monitored. Absorption cross sections for these species were experimentally determined. The techniques used included closed cell decay profiles, with and without photolyzing light, constant illumination of flow systems and modulation of species in a flow system with intermittent photolytic illumination. DOE

N80-13207# Krupp (Fried.) G.m.b.H., Rheinhausen (West Germany). KRUPP Forschungsinstitut.
EXAMINATION AND SELECTION OF SUITABLE METHODS FOR MEASURING THE THERMAL CONDUCTIVITY OF LIQUIDS IN SPACELAB Final Report
Hubert Coenen, Theo Gast, and Peter Krischker Bonn Bundesmin. fuer Forsch. u. Technol. Sep. 1978 43 p refs In GERMAN; ENGLISH summary Prepared in cooperation with Tech. Univ., Berlin
(Contracts BMFT-WRT-1075; DFVLR-01-QV-176)
(BMFT-FB-W-78-09) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,42

The measurement of the thermal conductivity of liquids, without the adulterating influence of free convection, was studied assuming microgravity conditions, such as those abtainable in Spacelab. Results contributed to the selection of a suitable measuring method for this purpose are presented. Stationary and nonstationary methods were compared, the stationary measuring principle finally being chosen. A measuring cell was designed and built as per the determined specifications. Space qualification tests were successfully completed and the instrument is considered ready for flight. Author (ESA)

N80-13074# Academy of Sciences (USSR), Moscow.
INVESTIGATION OF THE STRUCTURE OF Te-Se SOLID SOLUTIONS OBTAINED UNDER DIFFERENT GRAVITY CONDITIONS ON BOARD THE SALYUT 6 STATION, IN A CENTRIFUGE
G. E. Ignatjev (Moscow Inst. of Steel and Alloys), A. S. Okhotin

(Moscow Inst. of Steel and Alloys), Yu. S. Avraamov et al *In* ESA Mater. Sci. in Space Jun. 1979 p 33-39 (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13085# Technische Hogeschool, Delft (Netherlands).
UNIDIRECTIONAL SOLIDIFICATION OF EUTECTIC IRON-CARBON ALLOYS AND THE SEGREGATION OF SULFUR
T. Luyendijk and H. Nieswaag *In* ESA Mater. Sci. in Space Jun. 1979 p 115-122 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13106# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
RECONSIDERATION OF MACROSEGREGATION DURING NONSTATIONARY SOLIDIFICATION [RECONSIDERATION DE LA MACROSEGREGATION EN SOLIDIFICATION NON STATIONNAIRE]
J. J. Favier *In* ESA Mater. Sci. in Space Jun. 1979 p 297-305 refs In FRENCH (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N80-13208 Case Western Reserve Univ., Cleveland, Ohio.
SPECIFICITY HYDROGEN AND STRESS CORROSION CRACKING IN AUSTENITIC STAINLESS STEEL Ph.D. Thesis
Richard Lee Shamakian 1979 151 p
Avail: Univ. Microfilms Order No. 7924803

The relationship between localized corrosion, film formation and SCC in the austenitic stainless steels is presented. SCC was not observed unless some form of localized attack, such as pitting, occurred. A trench crevice corrosion phenomenon tended to occur in some of these chloride solutions due to the breaking of the protective film by the applied stress. These trenches tended to look like cracks at low magnifications. However, this trenching phenomenon was not SCC but rather an occluded cell corrosion process which must occur before stress corrosion cracks develop in the metal. Evidence was obtained of an embrittled region ahead of the stress corrosion cracks. This was done through SEM and EDS work on samples partially stress corrosion cracked in LiCl solution and then pulled to failure in air. All the data are consistent with a hydrogen embrittlement mechanism of SCC. Dissert. Abstr.

N80-13209 Syracuse Univ., N. Y.
AN ADSORPTION STUDY OF HYDROGEN ON IRON AND ITS RELATION TO HYDROGEN EMBRITTLEMENT Ph.D. Thesis
Craig Mitchell Ransom 1979 70 p
Avail: Univ. Microfilms Order No. 7925596

The adsorption isotherm and magnetization-adsorption isotherm for H2 on Fe at 77 K were determined to be Langmuirian. This, plus a first order adsorption rate are given as evidence for the existence of a chemisorbed molecular H2(+) ion at this temperature. The mechanical test data of other investigators for slow crack growth in gaseous H2 which show a non-monotonic increase of crack growth rate with temperature becomes explainable based on a measured decrease in the adsorption of H2 at temperatures above 300 K and a two step adsorption process. At temperatures below 300 K the formation of an H(-) ion from the adsorbed H2(+) ion is rate controlling because it is an activated process and the ion is the embrittling species. At temperatures above 300 K, the decreasing net adsorption rate of H2(+) becomes the limiting process. Adsorption data for H2S showed Temkin isotherm behavior and adsorption rates considerably greater than that for hydrogen. Dissert. Abstr.

N80-13210 Case Western Reserve Univ., Cleveland, Ohio.
SECTION SIZE EFFECTS ON TOUGHNESS OF VARIOUS CAST STEELS Ph.D. Thesis
Jose Ignacio Gomez-Gallardoy Latapi 1979 128 p
Avail: Univ. Microfilms Order No. 7924815

The tensile toughness and microstructure properties were determined for several commonly specified cast steels. These steels were provided in one, three and five inch plate thickness by several commercial foundries. The tensile strength of the quenched and tempered steels decreased somewhat with increasing section size; the effect of mass on the strength of the normalized and tempered steels was much smaller. The differences in elongation and reduction in area values at different section thickness are both small and erratic for both the quenched and tempered and normalized and tempered grades. Dissert. Abstr.

N80-13211 Case Western Reserve Univ., Cleveland, Ohio.
THE INFLUENCE OF THERMAL HISTORY, DEFORMATION, AND COMPOSITION, ON STRESS CORROSION CRACKING OF FERRITIC STAINLESS STEELS Ph.D. Thesis
Terry Wallace Mohr 1979 130 p
Avail: Univ. Microfilms Order No. 7924826

The performance of several high chromium ferritic stainless steels in boiling chloride solutions was examined with the intent of identifying the influence of high temperature exposure, cold deformation, and nickel content on susceptibility to stress corrosion cracking, SCC. It was found that the immunity to SCC of these alloys can be lost by any high temperature treatment which increases the ferrite grain size beyond a specific level. Loss of SCC performance could not be recovered by any subsequent anneal at a lower temperature once a coarse grain size was developed. Activation of both brittle delayed failure phenomena at identical grain size suggests a similarity in basic failure mechanisms which emphasizes the role of hydrogen. Dissert. Abstr.

N80-13212 Columbia Univ., New York.
DAMAGE OF METAL SURFACES BY A HOT, DENSE DEUTERIUM PLASMA Ph.D. Thesis
Nicholas Frank Panayotou 1979 95 p
Avail: Univ. Microfilms Order No. 7924954

The effect of differences in alloy chemistry and systematic changes in microstructural interface density on the occurrence of unipolar arcing are demonstrated. It was determined that unipolar arcing occurs on all metals and alloys tested; the surface area affected by unipolar arcing is surprisingly similar even for different metal systems; the effect of some alloying additions on unipolar arcing is minor, and arcing is very sensitive to microstructual interface density for nonrefractory metals. The significance of the work, in terms of actual power reactors is assessed and the need for further work defined. Dissert. Abstr.

N80-13213 Columbia Univ., New York.
CREEP BEHAVIOR OF PRECIPITATION AND OXIDE DISPERSION STRENGTHENED SUPERALLOYS Ph.D. Thesis
Timothy Evan Howson 1979 103 p
Avail: Univ. Microfilms Order No. 7924908

The intermediate and elevated temperature creep behavior of two new high temperature mechanical alloys is presented. One is an oxide dispersion strengthened (ODS) nickel-base solid solution, the other is a unique ODS nickel-base super-alloy that combines both inert dispersion strengthening and precipitation strengthening. A generalized expression was formulated for creep rates that separates the second phase particle contribution to the back stress from the matrix solid solution phase contribution. The matrix phase is seen to play an important role in the creep resistance of these particle strengthened alloys. Specifically, the stronger the matrix through solid solution strengthening, the less applied stress sensitive is the creep rate of the alloy. These findings are discussed with respect to alloy design for better creep resistance in multiphase alloys. Dissert. Abstr.

N80-13214 Northwestern Univ., Evanston, Ill.
CYCLIC CREEP BEHAVIOR OF PURE ALUMINUM AND 7050 ALUMINUM ALLOY Ph.D. Thesis
Herng-Der Chiou 1979 188 p
Avail: Univ. Microfilms Order No. 7927317

The cyclic creep acceleration (CCA) was characterized in pure aluminum at 295 K and for peak stress from 25.5 MPa to

35.3 MPa. The average cyclic creep rate calculated using loading time increased with increasing the amount of stress reduced during partial unloading and with an increase in the time duration of the unloading period. A theoretical model, developed to relate the internal stress to the cyclic creep behavior observed for pure metals, is described. The TEM observation indicates that the maximum aged 7050 aluminum alloy is characterized by the formation of narrow and distinct slip bands when it exhibits significant CCA. The theoretical calculation of internal stress confirmed this observation by predicting the lower internal stress by the formation of the narrower slip bands, thereby, enhanced CCA. A mechanism based on dislocation pile-up at the outer boundary of the 'soft' regions of the alloy was proposed to explain how cyclic loading promotes the formation of the narrow slip bands at the low stress level. In the CCD regime, observed at high peak stresses and/or high temperature, cyclic loading tended to widen the slip bands. This widening resulted in an increase in the internal stress. Dissert. Abstr.

N80-13215 Pennsylvania Univ., Philadelphia.
THE RATE OF DISSOCIATION OF CO2 ON LIQUID IRON AND NICKEL Ph.D. Thesis
Alan William Cramb 1979 143 p
Avail: Univ. Microfilms Order No. 7928119

A radioactive exchange technique was used to study the rate of dissociation of CO2 on liquid iron, nickel and iron nickel alloys. The basis of the exchange technique is the reaction, CO2 -14 yields CO2 -14 + O adsorbed on the surface, where measurements of the amount of CO-14 formed during a reaction lead to a measurement of the apparent rate constant for dissociation of CO2. This led to a method of determination of the adsorption coefficient of oxygen on liquid iron and liquid nickel. Dissert. Abstr.

N80-13216 Northwestern Univ., Evanston, Ill.
THE ELASTIC MODULUS AND DIFFUSION COEFFICENTS OF SILVER-PALLADIUM COMPOSITION MODULATED FOILS Ph.D. Thesis
Gerard E. Henein 1979 167 p
Avail: Univ. Microfilms Order No. 7927363

The biaxial elastic modulus Y [111] was measured on Cu-Au and Ag-Pd thin films containing short wavelengths composition modulations. The effective interdiffusion coefficients were maasured from the decay rate of X-ray diffraction satellite intensities at 375 C in 13 Ag-Pd modulated foils having wavelengths in the range 0.94-5.08 nm. When plotted versus the dispersion relation, the interdiffusion coefficient exhibited a sharp decrease at 2.3 nm and a gradual decrease between 4.0 and 5.0 nm. The screening singularity previously mentioned is considered to be responsible for the decrease at 2.3 nm and the drop at 4.0 nm would be consistent with a loss of coherency in the films. A non-linear regression fit to the interdiffusion coefficient vs the dispersion relation curve yielded the first four gradient energy coefficients. Dissert. Abstr.

N80-13217 Purdue Univ., Lafayette, Ind.
X-RAY MEASUREMENT OF CARBON-CAUSED ATOMIC DISPLACEMENTS IN Fe-Ni-C MARTENSITE Ph.D. Thesis
Pei Chen Chen 1979 137 p
Avail: Univ. Microfilms Order No. 7926352

Individual 200, 020, and 002 X-ray peaks were recorded for Fe-18 wt% Ni-0.98 wt% C martensite formed in an austenite single crystal after quenching in place in the X-ray diffractometer and after tempering at temperatures between -45 C and 400 C. The 200/020 and 002 peaks from Fe-18 wt% Ni-0.90 wt% C martensite formed in polycrystalline austenite were recorded using the same technique. Some regions of the as-quenched martensite formed in polycrystals are nearly cubic but the martensite formed in single crystals is all tetragenal. The nearly cubic regions may have been induced by intersections of martensite plates. Measurement of the locations and intensities of the peaks show that in the as-quenched martensite all the carbon is in the c sublattice of the octahedral interstitial sites and that the carbon displaces its nearest metal atoms by about 0.50 A.
Dissert. Abstr.

N80-13218*# Inco Research and Development Center, Suffern, N. Y.
CHARACTERIZATION OF AN OXIDE DISPERSION STRENGTHENED SUPERALLOY, MA-6000E, FOR TURBINE BLADE APPLICATIONS Final Report
Y. G. Kim and H. F. Merrick May 1979 37 p refs
(Contract NAS3-20093)
(NASA-CR-159493) Avail: NTIS HC A03/MF A01 CSCL 11F

Alloy MA 6000E was developed by the mechanical alloying process for turbine blade applications. The nominal composition of the experimental alloy is Ni-15CR-2Mo-4W-4.5Al- 2.5Ti-2Ta-.15Zr-.05C-.01B-1.1Y2O3. The 1000 hour rupture strength in the longitudinal direction is about 145 MPa at 1093 C and about 483 MPa at 760 C. The alloy displays normal three-stage creep behavior. Typically the creep elongation is 3.5% at 760 C and 2% at 1093 C. The alloy is notch ductile (K sub 1 = 3.5). The rupture properties of the alloy are not significantly degraded by thermal cycling or prior stress isothermal exposure. The alloy also has excellent longitudinal high and low cycle fatigue resistance. Limited testing indicates that MA 6000E posesses good off-axis mechanical properties. The transverse tensile elongation at 760 C is about 3%. The 100 hour transverse rupture strength is 331 MPa at 760 C and about 55 MPa at 1093 C. A.R.H.

N80-13219# Air Force Engineering and Services Center, Tyndall AFB, Fla. Engineering and Services Lab.
CORROSION CONTROL OF HARDENED INTERSITE CABLE SYSTEM (HICS) SPLICE CASE Final Report, Nov. 1975 - Mar. 1979
Thomas F. Lewicki May 1979 46 p
(AF Proj. 2054)
(AD-A073431; AFESC/ESL-TR-79-17) Avail: NTIS HC A03/MF A01 CSCL 09/1

Several thousand splice cases are in use on the hardened intersite cable system between the Strategic Air Command's Minuteman silos. These splice cases are exposed to severe galvanic corrosion caused by interconnection with the graphite impregnated, polyethylene cable sheath which acts as a large cathode. The Air Force Civil Engineering Center conducted laboratory and field tests to determine the magnitude of corrosion for the three different splice cases in use and to develop the surface potential criteria necessary to achieve adequate cathodic protection (CP). Test results showed that aluminum splice cases fail quicker than cast iron, and that bronze splice cases with bronze connecting hardware experience little corrosion. The interconnection of dissimilar metals (graphite and splice case) resulted in the surface potential criteria being significantly different from the standard CP criteria of either a -.85 volt surface potential or a negative 300 millivolt shift. The revised criteria for an aluminum splice case called for a surface potential of -.55 volt or a negative 409 millivolt shift, whereas the cast iron splice case required a surface potential of -.34 volt or a negative 510 millivolt shift. The revised surface potential criteria and the procedure developed to determine the degree of corrosion can be used on any underground metallic system with dissimilar metals. GRA

N80-13220# Israel Inst. of Tech., Haifa.
ELECTRONMICROSCOPIC STUDY OF SAND EROSION PROCESSES IN METALS Final Report, 1 Mar. 1978 - 28 Feb. 1979
Joseph Zahavi Jun. 1979 39 p refs
(Grant AF-AFOSR-3580-78; AF Proj. 2301)
(AD-A073497; EOARD-TR-79-523) Avail: NTIS HC A03/MF A01 CSCL 11/6

Knowledge and understanding of the variables, both environmental and metallurgical, affecting erosion of materials, are detrimental to predicting erosion behavior and minimizing erosion damage. In this study erosion behavior of composite aluminum alloys containing hard phase constituents such as silicon carbides and alumina has been investigated. Use has been made of electron microscopy techniques for examination of eroded surface morphology, structure and composition with special attention to the effect of hard phase particles on erosion processes i.e. material removal. It has been found that higher fraction of hard particles in metal alloy led to higher target weight loss under the same erosion conditions. Observations of eroded surface obtained by SEM suggest that erosion process or material removal

is composed of two basic processes: (a) local material removal from particle-free surface target and (b) complete removal of hard particles from the eroded target surface. The role of hard phase constituents on erosion process in composite metal alloys should be investigated further. GRA

N80-13221# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
LOSS OF LATTICE RIGIDITY IN AUSTENITE Technical Report, Oct. 1978 - Sep. 1979
Nicholas DeChristofaro (Allied Chem. Corp. Morristown, N. J.) and Roy Kaplow 2 Aug. 1979 9 p refs Submitted for publication
(Contract N00014-76-C-0171)
(AD-A073280; TR-2) Avail: NTIS HC A02/MF A01 CSCL 11/6

Mossbauer spectra were taken at and below room temperature in iron-2.4 wt.% nitrogen samples containing various amounts of stabilized martensite and austenite. The intensities of the martensite spectra increase with decreasing temperature as expected from the normal thermal variation of the recoilless fraction. Conversely, the intensities of the austenite spectra are smaller below room temperature and Ms, and decrease with decreasing temperature. This corresponds to a decreasing recoilless fraction, which is associated with a lessening of lattice resistance to excitations caused by the transference of the gamma-ray recoil momentum. This behavior is thought to be related to lattice instabilities in the austenite phase, possibly related to its transformation to martensite. The magnitude of the effect indicates that, although the excitations in themselves may be localized, these instabilities are characteristic of the bulk material and cannot be explained in terms of the conventional theory of pre-existing martensitic embryos. GRA

N80-13222# Massachusetts Inst. of Tech., Cambridge.
STRESS-ASSISTED ISOTHERMAL MARTENSITIC TRANSFORMATION AND TRANSFORMATION PLASTICITY
G. B. Olson and Morris Cohen Jul. 1979 8 p refs Presented at Joint U.S. - Japan Conf. on Mech. Behavior of Metals and Alloys Assoc. with Displacive Phase Transformations, Troy, N.Y. 12-15 Jun. 1979
(Contract N00014-76-C-0171)
(AD-A073433; TR-3) Avail: NTIS HC A02/MF A01 CSCL 11/6

Low-temperature plastic flow in TRIP steels has been found to be controlled by stress-assisted isothermal martensitic transformation. Under these conditions, theory of the transformation kinetics can be used to predict the temperature dependence of the flow stress, the shape of the stress-strain curve, and the dependence of flow properties on stress state. GRA

N80-13223# Illinois Univ. at Urbana-Champaign. Dept. of Metallurgy and Mining Engineering.
APPLICATION OF RAPID SOLIDIFICATION TECHNIQUES TO ALUMINUM ALLOYS Technical Report, 1 Feb. 1978 - 30 Jun. 1979
R. Mehrabian, C. G. Levi, S. C. Hsu, and S. Kou Jul. 1979 86 p refs
(Contract N00014-78-C-0275; ARPA Order 3517)
(AD-A073443) Avail: NTIS HC A05/MF A01 CSCL 11/6

This program is being conducted for the purpose of developing a predictive model of heat flow and solidification for aluminum alloys produced under the high cooling rate conditions achievable in atomization and surface melting. It is a combined experimental and theoretical study of the relationship between the important solidification variables (e.g. cooling rate, temperature gradients, interface shape and velocity, supercooling and transformation kinetics) and the structure and microchemistry of rapidly solidified aluminum alloys. This report covers the theoretical aspects of the investigation to date. The first part addresses the solidification of spherical droplets subjected to high rates of heat extraction achievable in various atomization processes. The second part is concerned with the two-dimensional transient heat flow occuring during rapid surface melting and solidification of a bulk substrate subjected to a high intensity heat flux over a circular region on its bonding surface. GRA

N80-13224# Sandia Labs., Livermore, Calif.
CHEMISTRY AND HEAT TREATMENT EFFECTS ON MECHANICAL AND MICROSTRUCTURAL PROPERTIES OF HEAT-TREATED, BETA-EXTRUDED Ti-6Al-6V-2Sn
M. G. Ulitchny, H. J. Rack, and D. B. Dawson Apr. 1979 50 p refs Revised
(Contract EY-76-C-04-0613)
(BDX-613-2170-Rev) Avail: NTIS HC A03/MF A01

The mechanical behavior of beta-extruded Ti6Al6V2Sn was examined after a variety of sub-transus heat treatments. The microstructural variations resulting from the range of heat treatments studied also were examined. A range of alloy chemistries, within commercial limits, was used to evaluate the effect of this variable on mechanical properties. The strength-toughness combinations obtained in beta-extruded Ti6Al6V2Sn ranged from about 895 MPa and 82.5 MPa square root of m for duplex annealed material to 1200 MPa and 54.9 MPa square root of m for solution treated and peak aged material. Chemistry variations had less effect on mechanical properties than would have been the case with alpha-beta processing. DOE

N80-13225# Brookhaven National Lab., Upton, N. Y.
NEUTRON SPECTROSCOPY OF FAST HYDROGEN DIFFUSION IN BCC TRANSITION METALS
D. Richter 1979 17 p refs Presented at Fast Ion Transport in Solids-Electrode and Electrolytes Conf., Lake Geneva, Wisc., 21 May 1979
(Contract EY-76-C-02-0016)
(BNL-26075; CONF-790538-1) Avail: NTIS HC A02/MF A01

Quasielastic neutron scattering reveals microscopic details of both the time and space development of the H-diffusion process on an atomic scale. After outlining the method on the example of PdH/sub x/, new results on the jump geometry in bcc metals are surveyed. In particular, the anomalous diffusion diffusion behavior of H in Nb, Ta, and V at elevated temperature is emphasized, where correlated jump processes are important. The influence of impurities on the H-diffusion process is demonstrated by experiments performed on NbH/sub x/ doped with nitrogen impurities, which act as trapping centers for the diffusing hydrogen. The results are discussed in terms of a two-state random walk model which includes multiple trapping and detrapping processes. The concentration and temperature dependence of the caputre and escape rates of traps are obtained. DOE

N80-13226# Oak Ridge National Lab., Tenn.
EFFECT OF PHASE INSTABILITIES ON THE CORRELATION OF NICKEL ION AND NEUTRON IRRADIATION SWELLING IN SOLUTION ANNEALED 316 STAINLESS STEEL
A. F. Rowcliffe, E. H. Lee, and P. S. Sklad 1979 21 p refs Presented at Conf. on Irradiation Behavior of Metallic Mater. for Fast Reactor Core Components, Corsica, France, 5 Jun. 1979
(Contract W-7405-eng-26)
(CONF-790657-2) Avail: NTIS HC A02/MF A01

Annealed 316 stainless steel specimens were neutron irradated to establish steady-state microstructures and then subjected to further high temperature irradations with approximately 180 C above reactor temperature. However, the precipitate microstructure developed during neutron irradiation is unstable during subsequent ion irradiation. As a result, the relative swelling rates at various reactor temperatures are not simulated correctly. DOE

N80-13227# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Materials Engineering.
DELAYED FAILURE OF VANADIUM-HYDROGEN ALLOYS
D. W. Chung and N. S. Stoloff 1979 10 p refs Presented at 3d Intern. Conf. on Mech. Behavior of Materials, Cambridge, England, 20 Aug. 1979
(Contract EY-76-S-02-3459)
(COO-3459-15; CONF-790820-2) Avail: NTIS HC A02/MF A01

Delayed failure experiments on vanadium and several hydrogenated alloys are presented. They resulted in two distinct patterns of behavior: ordinary stress-rupture behavior (nonembrittlement) in annealed vanadium and alloys with hydrogen in solution, and high susceptibility to delayed failure (embrittlement)

in the hydrided alloys. Reorientation of hydrides under stress was observed. Hydrogen in solution in vanadium did not play a major role in initiating delayed failure, although rupture stresses were lowered due to the enhancement of the local stress concentration factor by increasing flow stress. Hydrides did not crack at notch roots, suggesting that they produced an indirect effect on fracture behavior by increasing matrix yield stress, thereby reducing the blunting influence of the plastic zone at a crack tip. DOE

N80-13228# California Univ., Berkeley. Lawrence Berkeley Lab.
COMPUTER SIMULATION OF MARTENSITIC TRANSFORMATIONS IN IDEALIZED SYSTEMS Ph.D. Thesis
S. H. R. Chen Jun. 1979 172 p refs
(Contract W-7405-eng-48)
(LBL-9264) Avail: NTIS HC A08/MF A01

A straightforward computation of the elastic energy associated with an arbitrary distribution of defects in an elastically anisotropic body under the assumption that the body has uniform elastic constants and that anharmonic effects may be neglected is presented. The martensitic transformation is modeled as a transformation which occurs through the sequential formation of individual martensitic elements, each carries the elementary transformation strain. Statistical equations developed govern the selection of the transformation path, or sequence that elementary martensite particles appear in the model, and specifies the kinetic of transformation. A useful representative path is defined as the minimum energy path. The model is used for the detailed simulation of a martensitic transformation in a pseudo two-dimensional system. Virtually all interesting qualitative aspects of the developing martensitic transformation are shown to be inherently present within it. DOE

N80-13229# Brown Univ., Providence, R. I. Div. of Engineering.
COMBINED MACROSCOPIC AND MICROSCOPIC APPROACH TO THE FRACTURE OF METALS Progress Report
R. J. Asaro, J. Gurland, A. Needleman, and R. J. Rice Jun. 1979 58 p refs
(Contract EY-76-S-02-3084)
(COO-3084-69) Avail: NTIS HC A04/MF A01

Progress is reported on microscopic fracture mechanisms, including studies of void and crack initiation in steels in the absence and presence of hydrogen, the effects of hydrogen on ductile fracture in medium and high carbon steels; elastic-plastic crack growth including the quasi-stable growth of cracks in ductile solids under increasing load and conditions of instability; and elevated temperature rupture including analysis of the stress field near a crack tip in an elastic-nonlinear viscous material under tensile load as well as the processes of diffusion, and cavitation of grain boundaries in plastically creeping materials. DOE

N80-13230# Cornell Univ., Ithaca, N. Y. Dept. of Theoretical and Applied Mechanics.
IMPROVED BOUNDARY-INTEGRAL EQUATION METHOD FOR TIME-DEPENDENT INELASTIC DEFORMATION IN METALS
M. Morjaria and S. Mukherjee Feb. 1979 31 p refs
(Contract EY-76-S-02-2733)
(COO-2733-20) Avail: NTIS HC A03/MF A01

An efficient numerical implementation of the boundary integral equation method with a linear description of the relevant variables over each boundary element and a newly developed Euler type time-integration scheme with automatic time-step control for time integration is presented. Numerical results for plates in plane stress with and without cutouts, under different loading histories, are presented. A combined creep-plasticity constitutive theory with state variables is used to model material behavior. The results are more accurate and are obtained with much less computational effort compared to a previous attempt with a uniform description of variables over each boundary element and a predictor-corrector scheme for time-integration. The computer program developed is quite general and can handle plane stress problems for plates of arbitrary shapes subjected to arbitrary time-histories of loadings. DOE

N80-13231# Cornell Univ., Ithaca, N. Y. Dept. of Theoretical and Applied Mechanics.
ELONGATION UPON TORSION IN A THEORY FOR THE INELASTIC BEHAVIOR OF METALS
W. E. VanArsdale, E. W. Hart, and J. T. Jenkins Nov. 1978 31 p refs
(Contract EY-76-S-02-2733)
(COO-2733-1) Avail: NTIS HC A03/MF A01

The torsion of a thin-walled cylinder was studied using the low temperature of visco-plastic limit of Hart's state variable theory for the inelastic behavior of metals. For values of the shear stress lower than the hardness of the material, reversible elongation is found to accompany the recoverable twist. For shear stress exceeding the hardness, there are, in addition, a permanent twist and elongation. These predictions agree qualitatively with existing experiments. Quantitative results, for several loading histories, are obtained for nickel. DOE

N80-13232# Oak Ridge National Lab., Tenn.
ELEVATED TEMPERATURE EXPOSURE HAS SIGNIFICANT EFFECTS ON THE STRUCTURE OF AUSTENITIC STAINLESS STEEL WELDS
D. P. Edmonds and R. J. Gray 1979 11 p refs Presented at the Intern. Metallographic Soc. Conf., Montreal, Canada, 16 Jul. 1979
(Contract W-7405-eng-26)
(CONF-790736-1) Avail: NTIS HC A02/MF A01

An investigation of effects of aging and testing at 593 C on the structures of type 308 stainless steel weld metals was carried out. Shielded metal-arc (SMA) welds were made with electrodes formulated by a commercial manufacturer to produce four different concentration levels of delta-ferrite. By varying the chromium-to-nickel concentration ratios (within the type 308 limits) in the deposits, weld metals with nominally 2, 5, 10, and 15 FN were produced. Specimens from these materials were aged and creep tested in air at 593 C for times up to 36 Ms. Aged specimens were Charpy impact tested at room temperature. Both creep and impact-tested specimens were then examined metallographically. DOE

N80-13233# Rensselaer Polytechnic Inst., Troy, N. Y.
FATIGUE AND DELAYED FAILURE OF REFRACTORY METALS Annual Report
Norman S. Stoloff 15 Jan. 1979 22 p refs
(Contract EY-76-S-02-3459)
(COO-3459-14) Avail: NTIS HC A02/MF A01

Research is reported concerning delayed failure and fatigue behavior of polycrystalline vanadium and niobium and their alloys with hydrogen including delayed failure of Nb-H alloys, effect of temperature on fatigue life in vacuum, and crack propagation vs stress intensity. Previously reported results on delayed failure of hydride vanadium are reviewed with attention to details of the fracture process. Mechanical properties of candidate first wall materials are reviewed indicating the importance of fatigue and creep. DOE

N80-13234# Drexel Univ., Philadelphia, Pa. Dept. of Materials Engineering.
STRAIN HARDENING AND DUCTILITY OF IRON: AXISYMMETRIC vs. PLANE STRAIN ELONGATION Progress Report
George Langford May 1979 37 p refs
(Contract EY-76-S-02-4072)
(COO-4072-2) Avail: NTIS HC A03/MF A01

The strain hardening of iron at high strains in plane strain elongation (strip drawing) is shown to fall increasingly below that of drawn iron wires at true strains above 2. This makes it unnecessary to invoke shear band formation simultaneously as a strengthening mechanism and as a ductility reducing mechanism in the drawn strip. Rather, shear bands may be a weakening mechanism in all contexts. A set of specimens of interstitial-free iron deformed in three of the four main classifications of deformation symmetry (wire, strip, and chips, representing axisymmetric elongation, and pure shear) was prepared in the form of mechanical test specimens and thin foils for high resolution selected area diffraction. A simple technique for rapid discovery of the < 110 > axis of foils of strongly textured bcc wire was worked out. DOE

N80-13235# Arizona Univ., Tucson. Optical Sciences Center.
METAL SILVER-LIQUID INTERFACE: OXIDE PROPERTIES FROM REFLECTANCE AND SCATTERED LIGHT SPECTROSCOPY
D. K. Cohen, S. O. Sari, and K. D. Scherkoske 1979 8 p refs Presented at the Fast Ion Transport in Solids-Electrode and Electrolytes Conf., Lake Geneva, Wis.
(Contract EG-77-S-02-4381)
(COO-4381-7; CONF-790538-14) Avail: NTIS HC A02/MF A01

Electrochemically oxidized silver foils were examined using a reflectance and scattered light spectroscopy. The effect of unintentional inhomogeneous oxide formation on rough silver metal reflectivity is given. In contrast, the reflectance contribution of an intentionally formed oxide overlayer may be separated from that of the metal substrate. If the scattering contribution of the oxide-covered silver is small, the differential reflectance between oxidized and clean metal foils may be used to determine the approximate overlayer optical constants. The distribution of oxide module sizes at the metal boundary may be estimated from contributions due to inhomogeneous oxide residues. These results are compared to electron microscopy of the same surfaces. DOE

N80-13236# California Univ., Berkeley. Lawrence Berkeley Lab.
ALLOYING AND HEAT TREATMENT OPTIMIZATION OF Fe/Cr/C STEELS FOR IMPROVED MECHANICAL PROPERTIES M.S. Thesis
Mehmet Sarikaya Jun. 1979 89 p refs
(Contract W-7405-eng-48)
(LBL-9260) Avail: NTIS HC A05/MF A01

The effects of alloying elements and heat treatments on the microstructural changes and strength-toughness properties were investigated in optimization of vacuum melted Fe/Cr/C base steels. The structure of the steels in the as-quenched conditions consisted of highly dislocated autotempered lath martensite (strong phase) and thin continuous interlath films of retained austenite (tough phase). It has been emphasized that the mechanical properties of the steels are sensitive to the amount and the stability of retained austenite. To increase the stability of retained austenite in the as-quenched condition 2 w/o Mn or 2 w/o Ni was added to the base steel, viz., Fe/3Cr/0.3C. Partial replacement of Cr by about 0.5 w/o Mo did not alter the beneficial microstructure. DOE

N80-13237# Argonne National Lab., Ill. Chemistry Div.
DOMAIN AND SURFACE STRUCTURES OF SODIUM TUNGSTEN BRONZES, Na/SUB x/WO3 (0.4 < x < 1)
Masao Atoji Sep. 1978 64 p refs
(Contract W-31-103-eng-38)
(ANL-78-63) Avail: NTIS HC A04/MF A01

Optical microscopy, supplemented by chemical methods, photoelectron spectroscopy, electron microscopy, etc. was used to study the domain and surface structures of metallic sodium tungsten bronzes. The birefringent, multidomain structure of the bronze is exhibited by a sodium-deficient, epitaxial surface film and hence is not, as reported elsewhere, a bulk property. The film can be synthesized by anodic electrolysis in alkaline solution and can exist only epitaxially with the substrate. It is chemically inert, translucent, and often laminated to a multilayered film. The film domain is hypersensitive to lateral stress and to thermal change, and appears to be modulated by minute structural changes of the substrate. This epitaxial modulation of the film is strikingly large at the phase transitions of the substrate induced by slightly different tiltings of the oxygen octahedra. The domain-wall movement is often slow enough to be visible, and that by thermal effect is occasionally accompanied by an audible, high-pitched, snapping sound. DOE

N80-13238# Brookhaven National Lab., Upton, N. Y.
SCANNING REFERENCE ELECTRODE TECHNIQUES IN LOCALIZED CORROSION
H. S. Issacs and B. Vyas Apr. 1979 57 p refs Presented at the ASTM Symp., Prog. in Electrochem. Tech., San Francisco, 20 May 1979
(Contract EY-76-C-02-0016)
(BNL-26094; CONF-790574-1) Avail: NTIS HC A04/MF A01

The principles, advantages, and implementation of scanning reference electrode techniques are reviewed. Data related to pitting, intergranular corrosion, welds and stress corrosion cracking are presented. The technique locates the position of localized corrosion and can be used to monitor the development of corrosion and changes in the corrosion rate under a wide range of conditions. DOE

N80-13239# California Univ., Berkeley. Lawrence Berkeley Lab.
INFRARED ABSORPTION OF SPECTROSCOPY OF CARBON MONOXIDE ON NICKEL FILMS: A LOW TEMPERATURE THERMAL DETECTION TECHNIQUE Ph.D. Thesis
R. B. Bailey Nov. 1978 136 p refs
(Contract W-7405-eng-48)
(LBL-8482) Avail: NTIS HC A07/MF A01

Sensitive vibrational spectra of carbon monoxide molecules adsorbed on evaporated nickel films were measured by attaching a thermometer to the sample, cooling the assembly to liquid helium temperatures, and recording the temperature changes which occur when infrared radiation is absorbed. The measurements were made in an ultrahigh vacuum chamber in which the sample surface was cleaned, heated, exposed to gas molecules and cooled to 1.6 K for the infrared measurements. The spectra of chemisorbed CO molecules are interpreted in terms of the linear and bridge adsorption sites on the nickel surface, and they show how the distribution of molecules among these sites changes when the CO coverage increases and intermolecular forces become important. The spectra of physically adsorbed molecules in both monolayer and multilayer films are also reported. DOE

N80-13240# Oak Ridge National Lab., Tenn.
ANALYTICAL ELECTRON MICROSCOPE STUDY OF THE OMEGA PHASE TRANSFORMATION IN A ZIRCONIUM-NOBIUM ALLOY Ph.D. Thesis - Illinois Univ. at Urbana-Champaign
N. J. Zaluzec Jun. 1979 323 p refs
(Contract W-7405-eng-26)
(ORNL/TM-6705) Avail: NTIS HC A14/MF A01

An in-situ study of the as-quenched omega phase transformation in Zr-15% Nb was conducted between the temperatures of 77 and 300 K using analytical electron microscopy. The domain size of the omega regions observed in this investigation was on the order of 30 A, consistent with previous observations in this system. No alignment of omega domains along <222> directions of the bcc lattice was observed and in-situ thermal cycling experiments failed to produce a long period structure of alternating Beta and omega phase regions as predicted by one theory of this transformation. Several techniques of microstructural analysis were developed, refined, and standardized. Grouped under the general classification of analytical electron microscopy, they provide the experimentalist with a unique tool for the microcharacterization of solids, allowing semiquantitative to quantitative analysis of the morphology, crystallography, elemental composition, and electron structure of regions as small as 20 A in diameter. The microanalytical techniques employed are described. DOE

N80-13241# Oxford Univ. (England). Dept. of Engineering Science.
PLASTIC FLOW OF MILD STEEL UNDER PROPORTIONAL AND NON-PROPORTIONAL STRAINING AT A CONTROLLED RATE
S. A. Meguid (Oxford Polytech.), L. E. Malvern (Florida Univ. Gainesville), and J. D. Campbell 1979 26 p refs
(OUEL-1280/79) Avail: NTIS HC A03/MF A01

Thin tubular specimens of annealed mild steel (En8) were tested under combined straining using a tension-torsion, closed loop, servocontrolled, electrohydraulic testing machine. Two types of straining programs were used, proportional straining at constant strain rate and nonproportional straining in which the specimen was loaded to yield in pure torsion and then extended with the twist held constant. The resulting load and torque components were continuously recorded during each test as functions of time. Both proportional and nonproportional straining paths gave results in good agreement with the von Mises yield condition. Two theoretical analyses of the present problem are also included.

One uses Perzyna's constitutive laws for rate sensitive, but nonwork hardening material and the other uses a rate-independent theory. Comparison with the experimental results of the nonproportional straining program indicates that the time history of the neutral loading path was reasonably well matched by the prediction of both the rate-dependent and rate-independent theories. Author (ESA)

N80-13242# National Engineering Lab., East Kilbride (Scotland). Creep and Tribology Div.
AN INVESTIGATION OF MULTI-AXIAL CREEP CHARACTERISTICS OF METALS
J. Henderson Nov. 1978 27 p refs Sponsored by Engr. Mat. Requirements Board
(NEL-661) Avail: NTIS HC A03/MF A01

Conventionally, uniaxial creep test data provide the designer of engineering components with an assessment of the creep behavior at elevated temperatures of the metal with which he is concerned. For more rigorous design, methods are required whereby uniaxial creep data may be used to provide predictions of the behavior of those components for multi-axial stress conditions. Research into multi-axial creep relationship studied on a spectrum of engineering metals is described. Their use in the derivation of creep design methods for engineering components from tensile creep data is considered. Finally, an application of recently developed reference stress methods related to the prediction of the time dependent behavior of a representative engineering component under a complex stressing history is shown. Indications of the likely success of the reference stress technique as a tool for initial design assessment and its limitations are summarized. Author (ESA)

N80-13080# Bologna Univ. (Italy). Ist. di Fisica A. Righi.
DISPERSED GASEOUS AND SOLID PHASES IN MOLTEN AND SOLIDIFIED Cu
L. Castellani, P. Gondi, F. Barbieri, and N. Costa *In* ESA Mater. Sci. in Space Jun. 1979 p 81-87 refs Sponsored by CNR-SAS (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13081# Fulmer Research Inst. Ltd., Stoke Poges (England).
THE PREPARATION AND STABILITY OF METALLIC EMULSIONS IN A MICROGRAVITY ENVIRONMENT: AN EXPERIMENT FOR THE FIRST SPACELAB PAYLOAD (FSLP)
P. D. Caton and W. G. Hopkins *In* ESA Mater. Sci. in Space Jun. 1979 p 89-94 refs Sponsored by UK Dept. of Ind. (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13097# Royal Inst. of Tech., Stockholm (Sweden).
SOLIDIFICATION OF SOME EUTECTIC ALLOYS UNDER MICROGRAVITY CONDITIONS AND AT 1 g
T. Carlberg *In* ESA Mater. Sci. in Space Jun. 1979 p 221-231 refs Sponsored by Swed. Board for Space Activities (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13098# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Casting of Metals.
THE INFLUENCE OF MICROGRAVITY ON THE STRUCTURE OF Bi-Zn IMMISCIBLE ALLOYS
T. Carlberg and H. Fredriksson *In* ESA Mater. Sci. in Space Jun. 1979 p 233-243 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13100# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
PREPARATORY STUDIES FOR AN EXPERIMENT IN DIRECTIONAL SOLIDIFICATION OF IMMISCIBLE Al-In ALLOYS ON BOARD A ROCKET VEHICLE [ETUDES DE BASE PREPARATOIRES DE L'EXPERIENCE DE SOLIDIFICATION DIRIGEE D'ALLANGES IMMISCIBLES Al-In EN FUSEE SONDE]
C. Potard *In* ESA Mater. Sci. in Space Jun. 1979 p 255-262 refs In FRENCH (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13118# Wisconsin Univ., Madison. Dept. of Metallurgical and Mineral Engineering.
SOLIDIFICATION OF HIGHLY UNDERCOOLED LIQUID METALS AND ALLOYS
J. H. Perepezko, C. Galaup, and D. H. Rasmussen (Clarkson Coll. of Technol., Potsdam, N.Y.) *In* ESA Mater. Sci. in Space Jun. 1979 p 375-383 refs (For primary document see N80-13069 04-12)
(Grant DAAG29-78-G-0157)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13119# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
STUDY OF THE INFLUENCE OF GRAVITY ON THE SOLIDIFICATION OF IRREGULAR EUTECTIC ALLOYS [ETUDE DE L'INFLUENCE DE LA GRAVITE SUR LA SOLIDIFICATION DES EUTECTIQUES IRREGULIERS]
C. Lemaignan *In* ESA Mater. Sci in Space Jun. 1979 p 385-389 refs In FRENCH (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13120# Chalmers Univ. of Technology, Goteborg (Sweden).
AN EXPERIMENTAL METHOD FOR DETERMINATION OF MASS TRANSPORT IN LIQUID METALS TO BE APPLIED UNDER MICROGRAVITY
T. Persson *In* ESA Mater. Sci. in Space Jun. 1979 p 391-396 refs Sponsored by Swedish Board for Space Activities (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N80-13243 Utah Univ., Salt Lake City.
FRACTURE STUDIES IN CERAMICS WITH PARTICULAR EMPHASIS ON BETA'-ALUMINA Ph.D. Thesis
Jitendra Prasad 1979 158 p
Avail: Univ. Microfilms Order No. 7925043

A model is presented to explain the strength versus grain size effects in polycrystalline brittle materials. Assuming that the polycrystalline fracture surface energy is approximately an order of magnitude larger than the single crystal fracture surface energy, the model demonstrates that the dynamics of crack propagation and arrest are an integral part of a strength measurement. Using two functional forms for the variation of fracture surface energy with crack length/grain size ratio, strength versus (grain size) 1 1/2 plots were constructed. The concept of energy balance and the dynamics of crack propagation were further extended to explain variation in the stress-corrosion susceptibility parameter (N). It was shown that the N value obtained from strength versus loading rate plots in dynamic fatigue experiments may not represent a material parameter. Dissert. Abstr.

N80-13244 Old Dominion Univ., Norfolk, Va.
CURING AND FLOW OF THERMOSETTING RESINS FOR COMPOSITE MATERIAL PULTRUSION Ph.D. Thesis
Howard L. Price, Jr. 1979 150 p
Avail: Univ. Microfilms Order No. 7925656

An investigation was carried out to: (1) test and analyze several present and potential pultrusion materials; (2) analyze two pultrusion processes which were used to manufacture pultruded stock; and (3) develop a model from the tests and analyses and test it on a laboratory-scale pultruder constructed for that purpose as part of this investigation. The pultrusion process was studied with the objective of developing a model of the process applicable to thermosetting resins. Dissert. Abstr.

N80-13245 Alfred Univ., N.Y.
STRUCTURES, SPECTRA AND RELATED PROPERTIES OF TITANIUM-, ZIRCONIUM-, AND HAFNIUM-DOPED VITREOUS SILICA Ph.D. Thesis
Peter Paul Bihubuak 1979 156 p
Avail: Univ. Microfilms Order No. 7926489

The structures, as deduced from vibrational spectra and related physical properties, were examined for titanium-, zirconium-, and hafnium-containing vitreous silicas. Linear functional relationships were found between partial molar volume, refractivity, viscosity, coefficient of thermal expansion and dopant coordination throughout the dopant range examined. These structural models were consistent with ion coordination predictions based upon physical property measurements. Heat treating the 6.9 wt% TIO2-containing sample resulted in a thermal expansion increase due to the exsolution of rutile from the parent glass as suggested by Raman spectral and TEM analyses. Dissert. Abstr.

N80-13246 Florida State Univ., Tallahassee.
THERMAL SHRINKAGE MECHANISMS OF POLY (ETHYLENE TEREPHTHALATE) FIBERS Ph.D. Thesis
Randall Richard Bresee 1979 50 p
Avail: Univ. Microfilms Order No. 7926723

Differential scanning calorimetry, wide angle X-ray diffraction and refractive index measurements were used to determine the relative influence of amorphous disorientation and selective melting/recrystallization shrinkage mechanisms in the thermally induced shrinkage of fibers containing poly (ethylene terephthalate). The role of each mechanism in shrinkage associated with temperatures extending from well above the glass transition temperature to the temperature of maximum melting is discussed although both mechanisms fail to describe shrinkage associated with the glass transition. Dissert. Abstr.

N80-13247 Mississippi State Univ., State College.
EVALUATION OF POLAR AND NON-POLAR PLASTICS COMPOUNDED WITH THERMOMECHANICAL WOOD FIBERS Ph.D. Thesis
Gilmer Giovanni GonzalezGracia 1979 125 p
Avail: Univ. Microfilms Order No. 7927088

High and low lignin thermomechanical fibers that differ in method of manufacture were separated by screening and the average fiber length was determined for each mesh fraction. Attenuated total reflectance infrared analysis was conducted to obtain qualitative information about the chemical characteristic of the surface of the fibers. It concluded that the surface of thermomechanical fibers is partially covered with lignin. Also, these fibers are more compatible with both polar and non-polar polymers than are either wood flour or peanut hull flour. The high and low lignin fibers show promise for use as a reinforcing extender for polar polymers such as styrene-acrylonitrile copolymers. Both types of fibers also show potential for use as good quality, low-cost extenders in non-polar plastics such as polypropylene or polystyrene. Dissert. Abstr.

N80-13248 Wisconsin Univ. - Madison.
A CORRELATION BETWEEN MORPHOLOGY AND FRACTURE PROPERTIES OF EPOXY RESINS Ph.D. Thesis
Jovan Mijovic 1978 300 p
Avail: Univ. Microfilms Order No. 7921572

Various epoxy resin formulations, based on diglycidyl ether of bisphenol A and cured with diethylene triamine were studied in bulk and adhesive form. Methods of linear elastic fracture mechanics were employed and all systems were characterized by the corresponding values of the critical strain energy release rate for crack initiation and crack arrest. Fracture morphology was studied by scanning electron microscopy and transmission electron microscopy of carbon-platinum surface replicas. An apparent correlation between morphology and ultimate mechanical properties is discussed. Dissert. Abstr.

N80-13249 Tennessee Univ., Knoxville.
PREPARATION AND CHARACTERIZATION OF POLYMERS FORMED BY IRRADIATION OF BETA-PINENE AND OTHER MONOMERS Ph.D Thesis
Ashok Mohan Adur 1979 237 p
Avail: Univ. Microfilms Order No. 7927022

The gamma radiation-induced cationic polymerization of pinene was carried out under super-dry conditions. Chemical characterization by means of nmr, ultraviolet, and infra-red spectroscopic techniques and elemental analysis determined that the repeat unit X-ray diffraction methods were used to obtain crystallinity data and other morphological information. Thermal and solubility characterizations were also carried out. Auto-oxidation of the polymer resulted in the formation of peroxy and ketonic groups. Elemental analysis was used to determine the amount of oxygen incorporated in the auto-oxidized polymer. These results are discussed in comparison to those obtained for the commercial Polyterpene Resin, prepared by Lewis acid catalysis. Dissert. Abstr.

N80-13250 Polytechnic Inst. of New York.
A STUDY OF TERNARY SYSTEMS CONTAINING AN ACIDIC COPOLYMER, A BASIC COPOLYMER AND A SOLVENT Ph.D. Thesis
Said Djadoun 1979 169 p
Avail: Univ. Microfilms Order No. 7920774

Increasing densities of interacting groups were introduced into the polymeric chains studied to show how this affects the equilibrium of ternary systems containing two incompatible polymers. Phase diagrams were determined for ternary systems containing homopolymers or a mixture of an acidic and a basic copolymer with dioxane, chloroform or butanone. The solvent was found to have a great influence on the nature of the phase diagrams even for systems where the major constituent of the polymeric chains is the same. Dissert. Abstr.

N80-13251 State Univ. of New York Coll. of Environmental Science and Forestry, Syracuse.
FORMATION OF BLOCK POLYMERS INVOLVING POLY-(P-XYLELENE) BLOCKS Ph.D. Thesis
Anagnostis Efstathios Zachariades 1978 100 p
Avail: Univ. Microfilms Order No. 7920325

The synthetic feasibility of formation of block polymers involving poly-(p-xylelene) blocks was investigated by performing a series of reactions between p-xylelene and styrene, 2-vinyl pyridine, isoprene, butadiene, propylene sulfide, acrylonitrile, and tetrahydrofuran. The anionic polymerization of p-xylelene was initiated in solution at low temperature by electron transfer process and yielded a living poly-(p-xylelene) which is capable of growing further by the addition of other reactive monomers. Block polymers of p-xylelene and tetrahydrofuran were prepared through cationic polymerization in the presence of a suitable initiator. The block polymers prepared by this approach were isolated and characterized by qualitative and quantitative infrared spectroscopic analysis, elemental analysis, solubility tests and in some cases by X-ray diffraction analysis. Dissert. Abstr.

N80-13252 Utah State Univ., Logan.
CELL ADHESION AS INFLUENCED BY SUBSTRATE SURFACE PROPERTIES Ph.D. Thesis
Lee Merrill Smith 1979 115 p
Avail: Univ. Microfilms Order No. 7924340

A rotating shear disk is described for measuring short term (30 minute attachment) cell-substrate adhesion to selected substrates. Substrate surfaces are selected and prepared to obtain a wide variety of surface properties. Surface free energies are measured with captive air and octane angles on fully water extracted samples. Substrate surface chemistry is characterized via X-ray photoelectron spectroscopy for both bulk and spin cast thin films. Electrokinetic zeta potentials were measured via streaming potentials. The rotating shear disk has been demonstrated to reproducibly measure cell adhesion to a variety of substrates. Short term cell adhesion on adherent surfaces is a more consistent parameter than short term plating efficiency. On fairly nonadherent substrates, a measure of plating efficiency is more useful.
Dissert. Abstr.

N80-13253# Federal Aviation Administration, Washington, D. C.
COMPARATIVE EVALUTION OF FIREFIGHTING FOAM AGENTS Final Report, Jul. 1974 - Aug. 1977
George B. Geyer, Lawrence M. Neri, and Charles H. Urban 1979 114 p refs
(Contract FAA-081-431-100)
(AD-A074490; FAA-NA-79-2) Avail: NTIS HC A06/MF A01 CSCL 14/2

The fire extinguishing effectiveness of eight aqueous-film-forming-foams (AFFF), 11 fluoroprotein foams (FPF), and three protein form (PF) agents was investigated. Large-scale fire tests were performed under fixed fire conditions employing air-aspirating and non-air-aspirating nozzles on 82.4, 101, and 143 foot diameter

jet A fuel fires. Experiments were performed with only one foam agent which was considered representative of each class. Experiments tend to validate the continuation of allowing a 30 percent reduction in the water requirement at certificated U.S. airports when AFFF is substituted for protein form (Federal Aviation Regulation (FAR) Part 139.49) and to maintain a 1:1 equivalency ratio when fluoroprotein foam is substituted for protein foam. The data also tend to substantiate the validity of allowing an equivalent reduction in water requirements at airports when the 3 percent AFFF, FPF, and PF agents are substituted for the 6 percent agents within each class. A.R.H.

N80-13254*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

CHARACTERIZATION AND PROPERTIES OF CONTROLLED NUCLEATION THERMOCHEMICAL DEPOSITED (CNTD) SILICON CARBIDE

Sunil Dutta, Roy W. Rice (Naval Res. Lab., Washington, D.C.), Henry C. Graham (AFML, Wright-Patterson AFB, Ohio), and Madan C. Mendiratta (Systems Res. Lab., Dayton, Ohio) 1978 24 p refs Presented at 80th Annual Meeting of the Basic Sci. Div. of the Am. Ceramic Soc., Detroit, 6-11 May 1978
(NASA-TM-79277; E-210) Avail: NTIS HC A02/MF A01 CSCL 11G

The microstructure of controlled nucleation thermochemical deposition (CNTD) - SiC material was studied and the room temperature and high temperature bend strength and oxidation resistance was evaluated. Utilizing the CNTD process, ultrafine grained (0.01-0.1 mm) SiC was deposited on W - wires (0.5 mm diameter by 20 cm long) as substrates. The deposited SiC rods had superior surface smoothness and were without any macrocolumnar growth commonly found in conventional CVD material. At both room and high temperature (1200 - 1380 C), the CNTD - SiC exhibited bend strength approximately 200, 000 psi (1380 MPa), several times higher than that of hot pressed, sintered, or CVD SiC. The excellent retention of strength at high temperature was attributed to the high purity and fine grain size of the SiC deposit and the apparent absence of grain growth at elevated temperatures. The rates of weight change for CNTD - SiC during oxidation were lower than for NC-203 (hot pressed SiC), higher than for GE's CVD - SiC, and considerably below those for HS-130 (hot pressed Si3N4). The high purity, fully dense, and stable grain size CNTD - SiC material shows potential for high temperature structural applications; however problem areas might include: scaling the process to make larger parts, deposition on removable substrates, and the possible residual tensile stress. J.M.S.

N80-13255*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

FIRE-RESISTANT MATERIALS FOR AIRCRAFT PASSENGER SEAT CONSTRUCTION

L. L. Fewell, G. C. Tesoro (MIT, Boston), A. Moussa (MIT, Boston), and D. A. Kourtides Nov. 1979 20 p refs
(NASA-TM-78617; A-7946) Avail: NTIS HC A02/MF A01 CSCL 11G

The thermal response characteristics of fabric and fabric-foam assemblies are described. The various aspects of the ignition behavior of contemporary aircraft passenger seat upholstery fabric materials relative to fabric materials made from thermally stable polymers are evaluated. The role of the polymeric foam backing on the thermal response of the fabric-foam assembly is also ascertained. The optimum utilization of improved fire-resistant fabric and foam materials in the construction of aircraft passenger seats is suggested. M.M.M.

N80-13256*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

REACTIONS OF CALCIUM ORTHOSILICATE AND BARIUM ZIRCONATE WITH OXIDES AND SULFATES OF VARIOUS ELEMENTS

Isidor Zaplatynsky Oct. 1979 16 p refs Prepared for DOE
(NASA-TM-79272; E-192; DOE/NASA/2593-79/9) Avail: NTIS HC A02/MF A01 CSCL 11G

Calcium orthosilicate and barium zirconate were evaluated as the insulation layer of thermal barrier coatings for air cooled gas turbine components. Their reactions with various oxides and sulfates were studied at 1100 C and 1300 C for times ranging up to 400 and 200 hours, respectively. These oxides and sulfates represent potential impurities or additives in gas turbine fuels and in turbine combustion air, as well as elements of potential bond coat alloys. The phase compositions of the reaction products were determined by X-ray diffraction analysis. BaZrO3 and 2CaO-SiO2 both reacted with P2O5, V2O5, Cr2O3, Al2O3, and SiO2. In addition, 2CaO-SiO2 reacted with Na2O, BaO, MgO, and CoO and BaZrO3 reacted with Fe2O3. K.L.

N80-13257*# Acurex Corp., Mountain View, Calif. Aerospace Systems Div.

SYNTHESIS OF IMPROVED POLYESTER RESINS Final Report

A. H. McLeod and C. B. Delano 5 Jul. 1979 83 p refs
(Contract NAS3-21374)
(NASA-CR-159665; FR-79-13/AS) Avail: NTIS HC A05/MF A01 CSCL 11G

Eighteen aromatic unsaturated polyester prepolymers prepared by a modified interfacial condensation technique were investigated for their solubility in vinyl monomers and ability to provide high char yield forming unsaturated polyester resins. The best resin system contained a polyester prepolymer of phthalic, fumaric and diphenic acids reacted with 2,7-naphthalene diol and 9,9-bis(4-hydroxyphenyl)fluorene. This prepolymer is very soluble in styrene, divinyl benzene, triallyl cyanurate, diallyl isophthalate and methylvinylpyridine. It provided anaerobic char yields as high as 41 percent at 800 C. The combination of good solubility and char yield represents a significant improvement over state-of-the-art unsaturated polyester resins. The majority of the other prepolymers had only low or no solubility in vinyl monomers. Graphite composites from this prepolymer with styrene were investigated. The cause for the observed low shear strengths of the composites was not determined, however 12-week aging of the composites at 82 C showed that essentially no changes in the composites had occurred. Author

N80-13258*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala. Materials and Processes Lab.

DEVELOPMENT AND EVALUATION OF AN ABLATIVE CLOSEOUT MATERIAL FOR SOLID ROCKET BOOSTER THERMAL PROTECTION SYSTEM

W. J. Patterson Oct. 1979 46 p refs
(NASA-TM-78241) Avail: NTIS HC A03/MF A01 CSCL 11G

A trowellable closeout/repair material designated as MTA-2 was developed and evaluated for use on the Solid Rocket Booster. This material is composed of an epoxy-polysulfide binder and is highly filled with phenolic microballoons for density control and ablative performance. Mechanical property testing and thermal testing were performed in a wind tunnel to simulate the combined Solid Rocket Booster trajectory aeroshear and heating environments. The material is characterized by excellent thermal performance and was used extensively on the Space Shuttle STS-1 and STS-2 flight hardware. K.L.

N80-13259# General Electric Co., Schenectady, N. Y.

LEAD ZIRCONATE TITANATE (LZT) CERAMICS Final Report, 1 May 1976 - 30 Apr. 1979

J. H. Rosolowski, R. H. Arendt, and J. W. Szymaszek Aug. 1979 59 p
(Contract N00014-76-C-0659)
(AD-A073564; SRD-79-123) Avail: NTIS HC A04/MF A01 CSCL 11/2

A method of producing homogeneous, fully reacted lead zirconate titanate powder, including additive elements, by reaction of the oxides of the constituent metals in a molten salt solvent was developed. Ceramics fired from different batches of powder made in this was showed good batch-to-batch reproducibility of electrical and piezoelectrical properties. Investigation of the influence on the properties of the resulting ceramic of variations in the way such powder is prepared for pressing and fired, revealed that nominally identical powders sometimes behaved differently. It is concluded that lead zirconate titanate powder still cannot be characterized so as to predict, except in a general way, the properties of the ceramic fired from it. GRA

N80-13260# Bendix Corp., Kansas City, Mo.
IMPROVED BONDABILITY TO RTV SILICONE ELASTOMER USING rf-ACTIVATED GAS
J. L. Bellah May 1979 25 p refs
(Contract EY-76-C-04-0613)
(BDX-613-2157) Avail: NTIS HC A02/MF A01

Processing guidelines were developed, and a method was sought to satisfactorily bond RTV to the walls of a machined aluminum casting and to provide a surface on the RTV which would best accept bonding to an epoxy encapsulant. Processing parameters, such as gas type and flow rate, reaction chamber pressure, and rf power level, were developed. DOE

N80-13261# Argonne National Lab., Ill.
DEVELOPMENT OF TUNGSTEN COATINGS FOR THE CORROSION PROTECTION OF ALUMINA-BASED CERAMICS
R. M. Arons, J. T. Dusek, and J. W. Hafstrom 1979 7 p refs Presented at Intern. Conf. on Met. Coatings, San Diego, Calif., 23 Apr. 1979
(Contract W-31-109-eng-38)
(CONF-790442-13) Avail: NTIS HC A02/MF A01

A slurry of pure tungsten was prepared and applied by brush coating or slip casting on the alumina-3 wt % Yt small crucible. The composite was fired and a very dense ceramic crucible with a crack free tungsten coating was produced. DOE

N80-13262# Sandia Labs., Albuquerque, N. Mex.
FATIGUE AGING OF ADHESIVE BONDS
N. J. DeLollis 1979 15 p refs Presented at 10th US/UK Symp. on Neutron Generators, Albuquerque, N. Mex., 21 May 1979
(Contract EY-76-C-04-0789)
(SAND-78-1842C; CONF-790518-1) Avail: NTIS HC A02/MF A01

The effect of fatigue on the bond between two epoxy encapsulant formulations and a fused alumina disc was examined. The variables studied included isothermal aging at temperatures up to and including the cure temperature and cyclic thermal aging from +74 to -54 C. The encapsulants were glass microballoon filled epoxies differing only in curing agents. One was cured with an aromatic amine eutectic (Shell Curing Agent Z) and the other was cured with diethanolamine. The Z cured encapsulant bond failed completely at the bond interface with little or no aging; infrared evidence indicated a soluble interlayer as a possible cause of failure. The diethanolamine cured encapsulant survived a year of isothermal aging with little or no evidence of bond degradation. Cyclic thermal aging resulted in gradual bond failure with time. An extrapolation of the cyclic aging data indicates that the stresses induced by thermal cycling would result in complete bond failure in about 1200 days. DOE

N80-13263# California Univ., Livermore. Lawrence Livermore Lab.
CORONA-DISCHARGE TREATMENT OF POLYMERIC FILMS. 2: CHEMICAL STUDIES
J. F. Carley and P. T. Kitze (Colorado Univ.) May 1979 40 p refs Presented at 35th Annual Tech. Conf. of the Soc. of Plastic Engr. New Orleans, May 1979
(Contract W-7405-eng-48)
(UCRL-82709; CONF-790565-1) Avail: NTIS HC A03/MF A01

Polymeric films, chiefly polyethylenes, were subjected to corona-discharge treatment in a continuous treater at commercial rates in a program covering wide ranges of the main processing facrors. Electron-spin-resonance measurements on freshly treated films found no free radicals. The reactions of the treated surfaces with a free-radical compound, diphenyl picryl hydrazyl (DPPH), were studied focusing mainly on the rate effects. The evidence indicates that corona treatment produces fairly stable peroxide structures of the forms RO2R and RO3R on polyethylene surfaces. RO3R reacts rapidly with DPPH alone, while RO2R undergoes a slower reaction after addition of the catalyst, triethylene diamine. Regression analysis showed that air-gap thickness, relative humidity, and number of electrodes used also were significant factors, while dielectric thickness and corona frequence were not. DOE

N80-13264# Sandia Labs., Albuquerque, N. Mex.
SHOCK-INDUCED ELECTRICAL SWITCHING IN POLYMERIC FILMS
R. A. Graham 1979 9 p refs Presented at the 2d Intern. Conf. on Megagauss Magnetic Field Generation and Related Topics, Washington, D.C., 29 May 1979
(Contracts EY-76-C-04-0789; DE-AC04-76DP-00789)
(CONF-790540-11) Avail: NTIS HC A02/MF A01

Several compressed magnetic field generators use polymeric films to insulate explosively driven armatures from coils surrounding the armatures. Optimum device performance is achieved when the films remain electrically insulating prior to impact of the armatures but switch to highly conducting states upon impact on the film. The electrical switching properties of commercially available polymer films with high dielectric strength are reported. DOE

N80-13265# Oak Ridge National Lab., Tenn.
MODEL STUDIES OF MIXED-ION BETA-ALUMINAS
J. C. Wang, J. B. Bates, T. Kaneda, H. Engstrom, D. F. Pickett, Jr. (Hughes Aircraft Co., Los Angeles), and S. I. Choi (North Carolina Univ., Chapel Hill) 1979 13 p refs Presented at Fast Ion Transport in Solids-Electrode and Electrolytes Conf., Lake Geneva, Wis.)
(Contract W-7405-eng-26; Grant NSF DMR-78-2207)
(CONF-790538-8) Avail: NTIS HC A02/MF A01

Conductivity anomalies observed in mixed ion beta-aluminas were investigated by model calculations that included Coulomb, short range repulsive, and polarization energy terms. Results show that: (1) when large mobile cations are introduced into beta-aluminas having smaller cations, the large cations tend to occupy positions near Beevers-Ross sites alone; (2) small mobile cations introduced into a beta-alumina having larger mobile cations tend to form pairs either with themselves or with the larger cations; and (3) for a mixed ion pair, the activation energy of the larger ion to escape from the shared potential well is much higher than that of the smaller ion. DOE

N80-13266# Rosenthal-Stemag, Technische Keramik A.G., Selb (West Germany).
DEVELOPMENT OF HIGH TEMPERATURE RESISTANT, INCORRODIBLE, NON-METALLIC CERAMIC MATERIALS: THE USE OF SILICON NITRIDE FOR HEAT EXCHANGERS IN GAS TURBINE APPLICATIONS Final Report
Stefan R. Schindler and Axel Krauth Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1978 84 p In GERMAN; ENGLISH summary
(Contract BMFT-NTS-0007)
(BMFT-FB-T-78-51) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17,65

As part of a project to develop ceramic materials for automobile gas turbines, the use of silicon nitride was investigated. The definition of suitable production techniques as well as the realization of heat exchanger prototypes and gas turbine components was emphasized. Construction and testing under simulated application conditions is reported on in support of the production techniques as defined. This materials test data was then used to produce combustion chambers and stators. Test results for these components are positive and are used to justify suggestions for further research and development in this application. Author (ESA)

N80-13101# Technische Universitaet, Clausthal-Zellerfeld (West Germany). Lehrstuhl fuer Glas und Keramik.
REACTIONS BETWEEN GLASS MELTS
K. Herr, H. J. Barklage-Hilgefort, and G. H. Frischat *In* ESA Mater. Sci. in Space Jun. 1979 p 263-266 refs Sponsored in cooperation with Bundesmin. fuer Forsch. u. Technol. and DFVLR (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N80-13267 Kansas Univ., Lawrence.
BIOLOGICAL TRANSFORMATION OF LIGHT ENERGY INTO METHANE USING AN ANAEROBIC FILTER Ph.D. Thesis
Vicente JonguitudFalcon 1979 225 p
Avail: Univ. Microfilms Order No. 7925875

The feasibility of a biological system in converting solar energy into the chemical energy of methane is demonstrated. The proposed system consists of two biological reactors, an algae unit and an anaerobic filter, working together to fix solar energy in the form of algae photoplasm which is then anaerobically digested to produce methane. The algae fixes light energy by synthesizing inorganic materials into new protoplasm. The algae protoplasm is fed to an anaerobic filter where it is metabolized by anaerobic microorganisms producing methane, CO2, and inorganic end products. These inorganic end products are recycled back to the algae unit where they are reused to form more algae protoplasm. Dissert. Abstr.

N80-13268*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TEMPERATURE AND FLOW MEASUREMENTS ON NEAR-FREEZING AVIATION FUELS IN A WING-TANK MODEL
Robert Friedman and Francis J. Stockemer 1980 18 p refs To be presented at the 25th Intern. Gas Turbine Conf., New Orleans, 9-13 Mar. 1980; sponsored by ASME
(NASA-TM-79285; E-156) Avail: NTIS HC A02/MF A01 CSCL 21D

Freezing behavior, pumpability, and temperature profiles for aviation turbine fuels were measured in a 190-liter tank chilled to simulate internal temperature gradients encountered in commercial airplane wing tanks. When the bulk of the fuel was above the specification freezing point, pumpout of the fuel removed all fuel except a layer adhering to the bottom chilled surfaces, and the unpumpable fraction depended on the fuel temperature near these surfaces. When the bulk of the fuel was at or below the freezing point, pumpout ceased when solids blocked the pump inlet, and the unpumpable fraction depended on the overall average temperature. K.L.

N80-13269# Southwest Research Inst., San Antonio, Tex.
REFLECTED BLAST MEASUREMENTS AT SMALL SCALED DISTANCES FOR M26E1 PROPELLANT Final Report, Jan. - Dec. 1978
E. D. Esparza and J. J. Moroney Jun. 1979 54 p refs
(Contract DAAA21-76-C-0219)
(AD-A073409; AD-E400329; SwRI-02-4563-2; ARLCD-CR-79010) Avail: NTIS HC A04/MF A01 CSCL 19/1

This report describes an experimental program conducted in support of the US Army Modernization Program. Normal and oblique reflected blast parameters, including peak pressure and impulse, were measured to characterize the explosive output of multiperforated M26E1 propellant. Three sizes of spherical propellant charges were fired over a reflecting surface on which an array of pressure transducers was used to obtain pressure-time histories at scaled distances. A series of Pentolite tests was also conducted at similar scaled distances to establish a baseline for comparing the reflected blast parameters measured in the propellant experiments. The blast pressure and impulse data obtained showed that at the scaled distances tested the maximum explosive output of M26E1 propellant is comparable to Pentolite. GRA

N80-13270# Florida Univ., Gainesville. Dept. of Zoology.
LASER IGNITION OF SOLID PROPELLANT FORMULATIONS Final Report
Peter P. Ostrowski Jun. 1979 58 p refs
(Contracts DAAG29-78-C-0046; DAAK10-79-M-2239)
(AD-A073316; GC-TR-79-1036; ARO-16359.1-P) Avail: NTIS HC A04/MF A01 CSCL 21/9

The ignition of single grains of black powder using a pulsed laser (6943A) was investigated. The experiments were performed in air at atmospheric pressure with a laser which delivered total energy. The ignition process was monitored by streak interferometry, open shutter photography and by recording light emissions from the grain with a photodiode. The experiments showed that focussing of the laser beam was required in order to initiate combustion. Also, the ignition process for black powder was found to occur in a detonative mode. Combustion waves associated with the individual laser pulses were observed to originate at the surface of the grain and propagate outwards from the surface, forming a cloud of material in front of the grain. It was found that when the laser pulse was adjusted to deliver a powder density of 200,000 w/sq cm to the grain, self-sustained combustion could be achieved. At higher values of the power density, dynamic extinction of black powder occurred, i.e., combustion was not self-sustaining. Flame diagnostic measurements indicate that thermal mechanisms may be responsible for the observed phenomena. Additional experiments with double and triple based propellants show that other ignition mechanisms may prevail with these classes of propellants. GRA

N80-13271# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
CONVECTIVE IGNITION OF NITROCELLULOSE BASED PROPELLANTS IN UNSTEADY FLOW FIELDS Final Report, 1 Jul. 1978 - 30 Jun. 1979
Leonard H. Caveny, A. Birk, and W. A. Sirignano Jul. 1979 29 p refs
(Grant DAAG29-78-G-0153)
(AD-A073546; MAE-1445; ARO-15994.1-E) Avail: NTIS HC A03/MF A01 CSCL 21/9

This is a report on a continuing research directed at convective ignition of nitrocellulose-based propellants. The research encompasses flame theory, chemistry, and fluid dynamics. The primary objectives of the research are to determine the site and mode of convective ignition of propellant cylinders in crossflow and to determine the influence of igniter gas composition on the ignition events. Work is well under way to determine the conditions for which ignition occurs at the leading edge in the separation zone or in the wake. The laboratory approach developed (i.e., the use of a shock tunnel as the convective heating device) has been proved successful and over one hundred shock tunnel experiments have been conducted. All diagnostic devices (such as thin film gauges, miniature pressure transducer and radiation detectors) proposed last year were designed, fabricated and used successfully. Attention was focused on the different behavior of single, double and triple based propellants under the same test conditions, and on the importance of the transient boundary layer development time on ignition trends. To validate and substantiate the ignition trends, additional data collection and development of analytical models are needed. GRA

N80-13272# Sandia Labs., Albuquerque, N. Mex.
COAL LIQUEFACTION SHORT RESIDENCE TIME PROCESS RESEARCH Quarterly Report, 1 Oct. - 31 Dec. 1978
R. K. Traeger and T. C. Bickel Jul. 1979 27 p refs
(Contract EY-76-C-04-0789)
(SAND-79-1400; QR-1) Avail: NTIS HC A03/MF A01

Preliminary concepts have been identified for residence time measurements and further studies are underway to evaluate performance under reaction conditions. Current concepts include: solid phase residence time-magnetic tracer particles or manganese oxide with neutron activation; and liquid phase residence time-reflectance IR or high speed sampling with an organic tracer, radioactive tracer. Limited viscosity and surface tension measurements have been performed in an effort to predict the reactor flow regime. DOE

N80-13273# Department of Energy, Bartlesville, Okla. Energy Technology Center.
PHYSICAL PROPERTIES OF GASOLINE/ALCOHOL AUTOMOTIVE FUELS
F. W. Cox 1979 14 p refs Presented at 3d Intern. Alcohol Fuels Technol. Symp., Asilomar, Calif., 28-31 May 1979
(CONF-790520-4) Avail: NTIS HC A02/MF A01

The physical property changes (both beneficial and detrimental) which occur when alcohols are added to gasoline as fuel extenders are considered. The experimental data and discussion of results cover four physical properly areas: water tolerance, vapor pressure, distillation characteristics, and octane quality. The alcohols include methanol, ethanol, n-propanol, i-butanol, and synthetic methyl fuel. Several additional alcohols were tested, but only as gasoline/methanol cosolvents. The interdependency among the variables which are responsible for the significant property changes was determined so that, where possible, gasoline/alcohol properties can be estimated from blend composition. Trends are also discussed in terms of the general influences of system variables. DOE

N80-13274# Department of Energy, Bartlesville, Okla.
DRIVING CYCLE COMPARISONS OF ENERGY ECONOMIES AND EMISSIONS FROM AN ALCOHOL AND GASOLINE FUELED VEHICLE
R. L. Bechtold and B. Pullman (Santa Clara Univ., Calif.) 1979 13 p refs Presented at 3d Intern. Alcohol Fuels Technol. Symp., Asilomar, Calif., 28 May 1979
(CONF-790520-7) Avail: NTIS HC A02/MF A01

A late-model vehicle was converted to operate using methanol, gasoline, or ethanol as fuel and experimental work was done to obtain energy economy and exhaust emissions data for each of the three fuels. Results are compared at equal equivalence ratios both with and without an oxidation catalyst in the exhaust system. Using a catalyst for emissions control, unburned hydrocarbon emissions were lowest during lean operating conditions and were nearly the same for all three fuels under those conditions. Oxides of nitrogen emissions typically were reduced by over 50 percent in changing from gasoline to methanol or ethanol. Photochemical reactivities were calculated and comparisons were made among the fuels during cold start and FTP weighted tests. Gasoline exhaust was often calculated to have the lowest total reactivity during the FTP, however, methanol exhaust reactivity was lowest for the stoichiometric condition with catalyst. DOE

N80-13275# Department of Energy, Bartlesville, Okla. Energy Technology Center.
THE 50,000 MILE METHANOL/GASOLINE BLEND FLEET STUDY Progress Report
K. R. Stamper; 1979 14 p refs Presented at 3d Intern. Alcohol Fuels Technol. Symp., Asilomar, Calif., 28 May 1979
(CONF-790520-6) Avail: NTIS HC A02/MF A01

Seven current production automobiles are being used in a fleet study to obtain operational experience in using 10% methanol/90% gasoline blends as an automotive fuel. Data from chassis dynamometer tests (run according to the 1975-1978 Federal test procedure) show fuel economy and exhaust emissions of carbon monoxide, oxides of nitrogen, unburned fuel, methanol, and aldehydes. For each of the vehicles when operated on the 10% methanol blend, and on unleaded low octane Indolene. An average decrease in volumetric fuel economy (approximately 5%) and a reduction in carbon monoxide emissions were associated with the use of the 10% methanol blend. The most severe driveability problems encountered thus far are related to operating on a phase separated fuel and materials compatibility problems with an elastomer in the air-fuel control hardware of one vehicle. DOE

N80-13276# Karnataka Univ., Dharwar (India).
EVALUATION OF METHANOL FOR REDUCED EXHAUST EMISSIONS IN A SINGLE-CYLINDER RESEARCH ENGINE
B. S. Samaga, K. V. GopalaKrishnan (Indian Inst. of Tech., India), B. S. Murthy (Indian Inst. of Tech., India), R. K. Pefley (Santa Clara Univ., Calif.), R. L. Bechtold (DOE, Bartlesville, Okla.), and G. W. Edwards (DOE, Bartlesville, Okla.) 1979 12 p refs Presented at 3d Intern. Alcohol Fuels Tech. Symp., Asilomar, Calif., 28 May 1979
(CONF-790520-3) Avail: NTIS HC A02/MF A01

The influence of different operating parameters on the formation of oxides of nitrogen, carbon monoxide, unburned fuel, and the aldehydes in an internal combustion engine fueled by methanol and methanol-water mixtures is examined. Also, the effect of adding small quantities of aniline on the burning rate and aldehydes exhaust is explored. DOE

N80-13277# Brookhaven National Lab., Upton, N. Y.
REGENERATIVE PROCESS FOR DESULFURIZATION OF HIGH TEMPERATURE COMBUSTION AND FUEL GASES Quarterly Progress Report, 1 Jul. - 30 Sep. 1978
M.-S. Shen and J. M. Chen 1978 72 p refs
(Contract EY-76-C-02-0016)
(BNL-50944; QPR-10) Avail: NTIS HC A04/MF A01

A rotary kiln reactor was used to study the apparent solid-solid reaction between the sulfated limestone and the fly ash from a fluidized bed combustion. The experimental conditions were within the range for regeneration of the lime-based sorbents for fluidized-bed combustion. The measured SO2 concentrations were favorably interrelated with a derived mathematical model, with the major operating variables of the reactor, such as solid loading, temperature, gas flow rate, etc. The kinetic parameters of the regeneration reaction, the maximum attainable SO2 concentrations, and the effect of the molar ratio of C/S on the extent of CaSO4 conversion to CaO were obtained. Calcium silicate retained its activity when repeatedly cycled between sulfation and regeneration. A kiln reactor process for regenerating sulfated calcuim oxide reduces the environmental impact of fluid bed waste disposal and improves natural resource utilization. DOE

N80-13278# Purdue Univ., Lafayette, Ind. School of Chemical Engineering.
CONVERSION OF BIOMASS FROM AGRICULTURE INTO USEFUL PRODUCTS Final Report
George T. Tsao 31 Jul. 1978 37 p
(Contract EG-77-S-02-4298)
(COO-4298-1) Avail: NTIS HC A03/MF A01

The fermentation of the pentoses produced by the hydrolysis of hemicelluloses either to 2,3-butanediol by Klebsiella pneumoniae or to a mixture of 2,3-butanediol and ethanol by Aeromonas hydrophilia was studied to develop optimum conditions for the Klebsiella fermentation, confirm the xylose fermentation by Aeromona hydrophilia, and to study the growth of these microbes on pentoses and uronic acids and on actual hemicellulose hydrolyzates of corn stover. The results obtained in the solvent pretreatment in cellulose hydrolysis are reported. The solvents used were Cadoxen (solution of 5 to 7% cadmium oxide in 28% aqueous ethylene diamine), CMCS (an aqueous solution of 17% sodium tartrate, 6.6% ferric chloride, 7.8% caustic, and 6.2% sodium sulfite), and concentrated sulfuric acid. Almost quantitative yields of glucose can be obtained from the reprecipitated cellulose by enzymatic hydrolysis. DOE

N80-13279# Department of Energy, Washington, D. C.
ENVIRONMENTAL ANALYSIS OF SYNTHETIC LIQUID FUELS
12 Jul. 1979 144 p refs
(DOE/EV-0044) Avail: NTIS HC A07/MF A01

There appears to be no absolute environmentally related constraint identified for any of the first-generation surface conversion technologies (shale oil, coal liquefaction, and biomass production of ethanol). Second-generation processes run greater risks of major environmental problems. For in situ processes, the major risk is leaching of hazardous materials into water; for direct liquefaction, concern is potential worker and public exposure to toxic substances. Yet-to-be-defined regulations are perceived by developers as major technology development impediments. These include air quality standards (visibility, short-term nitrogen oxide and new PSD regulations), regulation of hazardous wastes and toxic products, underground injection guidelines, and worker safety regulations. Some risk exists that environmental R and D programs cannot fully satisfy all existing and expected regulatory demands, but these risks should be known by 1985 and it is expected that appropriate control adjustments can be made. DOE

N80-13280# Institute of Gas Technology, Chicago, Ill.
RESEARCH AND DEVELOPMENT OF RAPID HYDROGENATION FOR COAL CONVERSION TO SYNTHETIC MOTOR FUELS (RISER CRACKING OF COAL) Quarterly Report, 1 Oct. - 31 Dec. 1978
Dennis A. Duncan Mar. 1979 46 p refs
(Contract EX-76-C-01-2307)
(FE-2307-46; QR-3) Avail: NTIS HC A03/MF A01

Work on processing of caking coals was continued, and

methods of pretreating caking coals were developed and demonstrated by sucessful runs in the bench-scale unit. Exploratory work done to evaluate the effects of bentonite clay, iron oxide, and heating rate on the reaction system show that both bentonite clay and iron oxide have beneficial catalytic effects. Depth of carbon conversion was found to be more a function of severity of thermal treatment than heating rate over the range studied. Construction of the process development unit (PDU) continued, and much of the major equipment was received. Contracts were awarded for supplying high-pressure gases to the PDU. Fabrication of the preheater coil was completed, and construction of the preheater furnace is underway. Tests were continued in a low pressure simulator of a PDU combustor section, and for a coaxial construction, ceramic shields in the vicinity of the oxygen injection point do not appear to be necessary. DOE

N80-13281# Institute of Gas Technology, Chicago, Ill.
PREPARATION OF A COAL CONVERSION SYSTEMS TECHNICAL DATA BOOK, PROJECT 61003 Annual Report, 1 May 1977 - 30 Apr. 1978
Feb. 1979 577 p refs
(Contract EX-76-C-01-2286)
(FE-2286-32) Avail: NTIS HC A25/MF A01

The calculation of gas phase fugacity in NH3-H2S-H2O and NH3-CO2-H2O systems is described. Vapor-Liquid Equilibrium data on cyclohexane-water and four binary hydrogen-solvent systems have been presented. Data obtained on true densities of low rank coals and their chars are plotted as a function of hydrogen content (wt %, daf). Results of an investigation of formulas for calculating the heating value of coal from its composition are given. A formula, developed from the available data and having the least standard deviation is also presented. Data on minor and trace elements in coal are reviewed. A table of basic properties of pure components of coal liquids is included. Properties of benzene are presented in both S.I. and British Units. The theory of coal cleaning was discussed. DOE

N80-13282# Avco Systems Div., Wilmington, Mass.
ARC-COAL ACETYLENE PROCESS DEVELOPMENT PROGRAM Quarterly Technical Progress Report, 1 Oct. - 31 Dec. 1978
10 Jan. 1979 29 p refs
(Contract EM-78-C-02-4507)
(COO-4507-4; AVSD-0344-78-CR; QTPR-4) Avail: NTIS HC A03/MF A01

Improvements in the reactor design yielding SER's well below 5.0 are discussed. The anode and cathode performed well with no visible degradation after minor adjustments in the geometry and operating procedures. The data taken to date, both with and without quench, underline the importance of commencing work on the 1 Mw Arc Coal Acetylene PDU where SER values between 3.5 and 4.0 are a clear probability. With values of SER in this range, the arc coal process is economically attractive as a competitor to the ethylene process for manufacturing vinyl chloride monomer and vinyl acetate monomer. DOE

N80-13283# Mueller Associates, Inc., Baltimore, Md.
STATUS OF ALCOHOL FUELS UTILIZATION TECHNOLOGY FOR STATIONARY GAS TURBINES
Richard L. Rentz and Thomas J. Timbario Apr. 1979 35 p refs
(Contract EX-76-C-01-2098)
(HCP/M2098-03) Avail: NTIS HC A03/MF A01

Efforts being made to establish the feasibility of alcohols as fuels for stationary gas turbines were reviewed to determine if the status of technology has been defined regarding modification necessary to convert existing stationary gas turbines for operation with alcohol fuels, and to determine if the status of technology has been defined for the design of new stationary gas turbines operating on alcohol fuels. Results are presented in a format which describes the test work performed and characterizes the status of alcohol fuels technology (relative to stationary gas turbines) based on this test work. An overview of various factors that, from a systems viewpoint, would need to be considered if a serious effort were made to utilize alcohols as fuels for stationary gas turbines is included. DOE

N80-13284# Monsanto Research Corp., Miamisburg, Ohio.
COALIFICATION REACTIONS UNDER PRESSURE
G. Huck and K. Patteisky Sep. 1978 16 p refs Transl. into ENGLISH from Fortschr. Geol. Rheinl. Westfalen (West Germany), no. 12, Dec. 1964 p 551-558 Prepared for Monsanto Facility, Miamisburg, Ohio Transl. by Farnhm (Frank C.) Co., Philadelphia, Pa.
(Contract EY-76-C-04-0053)
(MLM-2556(TR)) Avail: NTIS HC A02/MF A01

The relationship of the mutual effect of pressure and temperature on the coalification reactions are presented. It was shown, contrary to theories often expressed in the literature, that the intensifying influence of pressure on coalification may be excluded if the pressure charge operates through shear- and friction-forces, without temperature changes and that the use of spores as coalification thermometers is limited. It is shown that at higher pressure spores may be exposed to temperatures above 200 C without showing thermal modifications. DOE

N80-13285# Department of Energy, Washington, D. C.
COMMERCIALIZATION STRATEGY REPORT FOR COAL LIQUEFACTION
E. A. Loyd, B. C. Almuala, A. K. Ingberman, L. M. Joseph, N. Lobe, J. S. Siegel, M. I. Singer, and J. H. Smithson 1979 35 p
(TID-28846) Avail: NTIS HC A03/MF A01

The commercial readiness of coal liquids is evaluated and barriers to be overcome are identified. It is concluded that: (1) coal liquids will address a major segment of the energy economy, petroleum and petroleum derived products; (2) methanol and Fischer-Tropsch processes are technically ready but economically uncompetitive; (3) scale up of direct hydrogenation processes to verify commercial feasibility requires major government funding; (4) federal assistance will probably be required for all first-of-a-kind commercial facilities; and (5) coal liquids will be economically competitive with imported petroleum by late 1980's or early 1990's. DOE

N80-13286# Department of Energy, Washington, D. C.
COMMERCIALIZATION TASK FORCE FOR HIGH Btu GASIFICATION
P. Gallo, Richard Passman, Dave Beecy, Allyn Hemenway, Arthur Ingberman, and John Pulice 1979 38 p
(TID-28849) Avail: NTIS HC A03/MF A01

The commercial readiness of high Btu gasification was investigated. It is found that the principal barriers to the commercialization of high Btu gas are: (1) the availability of capital, and (2) uncertainties regarding the marketability of supplies. Unless these barriers are removed, timely production of high-Btu gas is not likely to occur. A Federal role is recommended that would assist the private sector in capital formation with incentives that spread the financial risk appropriately among project beneficiaries. Of the incentives studied, two appear most effective: rolled-in pricing is seen as an important ingredient, especially in the early years of plant operation because of the high initial cost of gas; Federal loan guarantees are effective in assuring capital availability for the industry. Until loan guarantees become available, regulatory mechanisms provide the only remaining option. DOE

N80-13287# Gulf Research and Development Co., Pittsburgh, Pa.
RESEARCH AND DEVELOPMENT OF AN ADVANCED PROCESS FOR CONVERSION OF COAL TO SYNTHETIC GASOLINE AND OTHER DISTILLATE MOTOR FUELS Quarterly Report, Sep. 1978 - Nov. 1978
D. C. Succop and F. E. Wynne Dec. 1978 11 p
(Contracts EX-76-C-01-1800; E(49-18)-1800)
(FE-1800-33) Avail: NTIS HC A02/MF A01

Planned experiments to establish general ranges over which heater variables should be studied were completed. Unit modification was necessary to allow collection of high viscosity product from the heater outlet. Preliminary results indicate that increasing heater residence times and temperatures reduce the slurry viscosity by thermal cracking. At a low heater pressure of 1,000 psig and 2,000 scf/bbl of H2, heater slurry temperatures above 950 F resulted in increased viscosity and coking. DOE

N80-13288# Bituminous Coal Research, Inc., Monroeville, Pa.
GAS GENERATOR RESEARCH AND DEVELOPMENT: BI-GAS PROCESS Monthly Progress Report, Apr. 1979
May 1979 233 p refs Prepared in cooperation with Phillips Petroleum Co., Homer City, Pa.
(Contract EX-76-C-01-1207)
(FE-1207-62; MPR-92) Avail: NTIS HC A10/MF A01

A life test of two Ni/Mo catalysts, as well as their predecessors, was completed. The results showed that the sample tested was essentially the same as its predecessor. Generally, the activity of the catalyst was close to that predicted by the life test data. Analytical and computer services continued in support of the overall program. A written description of the fluidized-bed methanation PEDU automated data acquisition and reduction systems was generated and is included. DOE

N80-13289# Texaco, Inc., Montebello, Calif.
GASIFICATION OF RESIDUAL MATERIALS FROM COAL LIQUEFACTION Quarterly Report, Oct. - Dec. 1978
Allen M. Robin Mar. 1979 13 p
(Contract EX-76-C-01-2247)
(FE-2247-22) Avail: NTIS HC A02/MF A01

Materials from several coal liquefaction pilot plants were evaluated to determine their suitability as feedstocks for proprietary gasification processes. The chemical composition and physical properties of each material were determined. A preliminary pilot plant test was conducted. The operability of the process on the candidate feedstock was evaluated and estimates of preferred processing conditions, product gas yield and composition were made. R.E.S.

N80-13290# TRW Systems Group, McLean, Va. Energy Systems Planning Div.
METHANE RECOVERY FROM COALBEDS PROJECT. TECHNOLOGY TEST PROJECTS: EVALUATION OF CANDIDATE PROJECTS
Feb. 1979 25 p
(Contract EW-78-C-21-8089)
(METC-8089-T4) Avail: NTIS HC A02/MF A01

Twelve system test concepts for the recovery of methane from coalbeds and utilization of the gas in one or more applications are presented and evaluated. Four projects are recommended for further design development and analysis. R.E.S.

N80-13291# Gulf Research and Development Co., Pittsburgh, Pa.
RESEARCH AND DEVELOPMENT OF AN ADVANCED PROCESS FOR CONVERSION OF COAL TO SYNTHETIC GASOLINE AND OTHER DISTILLATE MOTOR FUELS Quarterly Report, Jun. - Aug. 1978
D. C. Succop and F. E. Wynne Sep. 1978 13 p
(Contracts EX-76-C-01-1800; E(49-18)-1800)
(FE-1800-30) Avail: NTIS HC A02/MF A01

Experimental results confirmed the predicted product liquid and coke yields for delayed coking or bituminous coal with petroleum vacuum residue. The expected modest synergism for liquid production was accompanied by synergistic improvement in liquid quality. Synergism was somewhat greater when undried sub-bituminous coal was used, confirming that coal slurries can be charged to delayed cokers and thereby release residual oil for incremental charging to fluid catalytic cracking. These results were used as the basis for a preliminary economic assessment of this medium impact interim process when used in existing petroleum refinery delayed cokers. DOE

N80-13292# Amoco Oil Co., Naperville, Ill. Research and Development Dept.
CATALYST DEVELOPMENT FOR COAL LIQUEFACTION Final Annual Report
R. J. Bertolacini, L. C. Gutberlet, D. K. Kim, and K. K. Robinson Jun. 1979 179 p refs Sponsored by EPRI
(Research Proj. 408-1)
(EPRI-AF-1084; AR-3) Avail: NTIS HC A09/MF A01

New catalysts for the hydroliquefaction of coal to a clean-burning fuel for power generation were screened. The performance of the new catalysts is discussed along with the performance of various hydrogen donor solvents. Modifications in the product workup procedure are described. The effect of various impregnating aids, such as phosphoric acid, on initial performance was investigated. Numerous catalysts were tested further on the continuous pilot plant to establish how their aging behavior responds to changes in surface properties and catalytic metals. Aged catalysts were also characterized extensively to establish the reasons for deactivation. DOE

N80-13293# Department of Energy, Washington, D. C. Div. of Fossil Fuel Extraction.
UNDERGROUND COAL CONVERSION. PROGRAM DESCRIPTION
Jun. 1979 70 p refs
(DOE/ET-0100) Avail: NTIS HC A04/MF A01

Results of the program presented indicate that, while underground coal gasification (UCC) is technically feasible, it still contains some process unknowns, environmental risks, and economic risks that require R and D. In order to contribute to the national energy goals, a strong DOE program which incorporates maximum industry involvement is planned. Major projects are described in some detail. A strong program of supporting activities is expected to address specific problems identified in the field testing and in order to advance UCC technology. The elimination of the high-risk elements of UCC by resolving those technical, environmental, and economic uncertainties that remain, and to enable industry to assume responsibility for commercialization of the process was considered. DOE

N80-13294# Brookhaven National Lab., Upton, N. Y.
COAL CONVERSION IN FLASH HYDROPYROLYSIS REACTORS
Vi-Duong Dang and M. Steinberg May 1979 57 p refs Presented at the 87th AICHE Natl. Meeting, Boston, 19 Aug. 1979
(Contract EY-76-C-02-0016)
(BNL-26209; CONF-790822-5) Avail: NTIS HC A04/MF A01

Analytical correlations of the experimental results for the Flash Hydropyrolysis of coal to gaseous and liquid hydrocarbons are presented. A three step reaction mechanism together with a particle-fluid interaction model is used to describe the system. The application of nonlinear estimation methods produces fair agreement between the experimental results and the postulated model. Explicit kinetic expressions as a function of temperature, pressure and reaction time for the reaction yields are developed. Reaction parameters for fluidized bed, entrained bed and fast fluidized bed designs are derived from the kinetic model. DOE

N80-13295# Oak Ridge National Lab., Tenn.
REVIEW OF SUPPORTING RESEARCH AT OAK RIDGE NATIONAL LABORATORY FOR UNDERGROUND COAL CONVERSION
P. R. Westmoreland and L. S. Dickerson 1979 14 p refs Presented at the 5th Underground Coal Conversion Symp., Alexandria, Va., 18 Jun. 1979
(Contract W-7405-eng-26)
(CONF-790630-9) Avail: NTIS HC A02/MF A01

Chemical and physical properties of lignite, subbituminous coal, bituminous coal, and overburden were measured. Generally, large, monolithic blocks of sample were dried and pyrolyzed. Thermal data and product yields can be correlated to provide an extrapolation from powder pyrolysis to the pyrolysis steps in underground coal gasification. Significant results include correlation of block pyrolysis data for low-rank coals, interpretation of mechanisms, and comparison between low-rank and bituminous coals; heating tests of overburden cores from the Hoe Creek field gasification site; and measurement of physical properties, particularly thermal diffusivity and thermal conductivity of low-rank coals. Correlations, mechanisms, and property measurements are reviewed, and applications to underground coal gasification are discussed. DOE

N80-13296# Los Alamos Scientific Lab., N. Mex.
SYNFUEL (HYDROGEN) PRODUCTION FROM FUSION POWER
R. A. Krakowski, K. E. Cox, J. H. Pendergrass, and L. A. Booth 1979 6 p refs Presented at the 14th Intersoc. Energy Conversion Conf., Boston, 5 Aug. 1979
(Contract W-7405-eng-36)

(LA-UR-79-1115; CONF-790803-9) Avail: NTIS HC A02/MF A01

A potential use of fusion energy for the production of synthetic fuel (hydrogen) is described. The hybrid-thermochemical bismuth-sulfate cycle was as a vehicle to assess the technological and economic merits of this potential nonelectric application of fusion power. DOE

N80-13297# Los Alamos Scientific Lab., N. Mex.
LIQUID HYDROGEN AS AN AUTOMOTIVE FUEL
W. F. Stewart 1979 17 p refs Presented at the 1979 Cryog. Eng. Conf., Madison, Wis., 21-24 Aug. 1979
(Contract W-7405-eng-36)
(LA-UR-79-621; CONF-790815-2) Avail: NTIS HC A02/MF A01

Hydrogen fuel projects involving six vehicles and six hydrogen liquid container designs are discussed. It is shown that service (refueling) stations and bulk distribution systems can be built using present technology. These can be similar in concept to the present service stations and distribution systems. Vehicle refueling and bulk liquid hydrogen transfer will probably be computer controlled as completely as possible. Liquid hydrogen can begin its entry into the automotive fuel picture as a fuel for fixed base vehicles such as trucks, buses, taxis, etc., and expand into the private sector as its availability increases. DOE

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N80-13298 Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 11, NUMBER 3
Mar. 1979 73 p refs
(AD-A066514/1) Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 13/9

Reviews of vibration analyses in relation to structural design and machinery are presented. Included are studies of dynamic snap-through of shallow arches and spherical caps, acoustic propagation in the ocean, and stability problems in rotary systems. For individual titles, see N80-13299 through N80-13301.

N80-13299 Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
DYNAMIC SNAP-THROUGH OF SHALLOW ARCHES AND SPHERICAL CAPS c39
S. M. Holzer *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 3 Mar. 1979 p 3-6 refs (For primary document see N80-13298 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington D. C. 20375 CSCL 20/11

The current literature on effects of asymmetric perturbation and the spatial distribution of the load on dynamic snap-through of shallow arches and spherical caps is reviewed. Two methods in the studies of asymmetric dynamic snap-through induced by symmetric loads are discussed. In one method conditions are sought that give rise to parametric excitation of the asymmetric motion. In the second method the Budiansky-Roth criterion is used to predict asymmetric dynamic snap-through from the nonlinear motion. A.W.H.

N80-13300 Naval Underwater Systems Center, New London, Conn.
A SURVEY OF FINITE ELEMENT-RELATED TECHNIQUES AS APPLIED TO ACOUSTIC PROPAGATION IN THE OCEAN. PART 1: FINITE ELEMENT METHOD AND RELATED TECHNIQUES c71
A. J. Kalinowski *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 3 Mar. 1979 p 9-16 refs (For primary document see N80-13298 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington D. C. 20375 CSCL 20/1

Finite element related techniques applied to acoustic propagation in the ocean are examined. Methods for modeling and simulation of boundary conditions are discussed including the related boundary solution method, and the boundary integral method. A.W.H.

N80-13301# Kobe Univ. (Japan).
STABILITY PROBLEMS ON ROTOR SYSTEMS c37
T. Iwatsubo *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 3 Mar. 1979 p 17-26 refs (For primary document see N80-13298 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington D. C. 20375 CSCL 13/9

Self excited lateral vibrations that cause instability of rotating machinery are examined. Instability phenomena are described and classified. The following causes of instability are described; internal damping, dry friction, journal bearing (oil whip), fluid forces, ball bearings, universal joint, and asymmetric factors. A.W.H.

N80-13302 Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 11, NUMBER 4
Apr. 1979 86 p refs
(AD-A067426/7) Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

Reviews of vibration analyses in relation to vibration properties, structural design, and machinery are presented. Included are the damping properties of turbine blades, acoustic propagation in the ocean, and the wind excited behavior of structures. For individual titles, see N80-13303 through N80-13305.

N80-13303 Rochester Inst. of Tech., N. Y.
DAMPING PROPERTIES OF TURBINE BLADES c37
N. F. Rieger *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 4 Apr. 1979 p 3-6 refs (For primary document see N80-13302 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 13/9

Damping properties of turbine blades, and metals and alloys is discussed. Damping literature pertaining to internal material damping, damping of steam turbine blade groups, and gas turbine blade damping is reviewed. A.W.H.

N80-13304 Naval Underwater Systems Center, New London, Conn.
A SURVEY OF FINITE ELEMENT-RELATED TECHNIQUES AS APPLIED TO ACOUSTIC PROPAGATION IN THE OCEAN. PART 2: TRANSPARENT BOUNDARY SIMULATION TECHNIQUES c71
A. J. Kalinowski *In* SVIC The Shock, and Vibration Digest, Vol. 11, No. 4 Apr. 1979 p 7-16 refs (For primary document see N80-13302 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/1

Finite element related techniques applied to acoustic propagation in the ocean are examined. Methods for modeling and simulation of boundary conditions are discussed including transparent boundary simulation techniques. A.W.H.

N80-13305 Loughborough Univ. of Technology (England).
WIND EXCITED BEHAVIOR OF STRUCTURES, 2 c39
D. J. Johns *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 4 Apr. 1979 p 17-29 refs (For primary document see N80-13302 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

The dynamic response and aeroelastic behavior of typical structural forms is discussed. Literature on wind excited responses of structures is reviewed. Responses such as vortex shedding, galloping oscillations, flutter, divergence and buckling, and turbulence are examined. A.W.H.

N80-13306 Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 11, NUMBER 5
Judith Nagle-Eshelman, ed. May 1979 92 p ref Presented

at the 50th Shock and Vibration Symp., Colorado Springs, 16-18 Oct. 1979
(AD-A069685/6) Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

Areas of vibration research and the development of techniques for vibration control are studied. Topics discussed include: aircraft flutter research; high temperature damping of dynamic systems; and reduction methods for problems of vibration of orthotropic plates. For individual titles, see N80-13307 through N80-13309.

N80-13307 Indian Inst. of Tech., Kanpur.
SOME RECENT TRENDS IN AIRCRAFT FLUTTER RESEARCH **c08**
P. N. Murthy *In* SVIC Shock and Vibration Digest, Vol. 11, No. 5 May 1979 p 7-12 refs (For primary document see N80-13306 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D.C. 20375 CSCL 01/3

The advances in research and development in the area of flutter are reviewed. Two innovations in aircraft configurations, oblique wings and control configured vehicles, are examined. A.W.H.

N80-13308 Air Force Materials Lab., Wright-Patterson AFB, Ohio.
HIGH TEMPERATURE DAMPING OF DYNAMIC SYSTEMS **c39**
D. I. G. Jones *In* SVIC Shock and Vibration Digest, Vol. 11, No. 5 May 1979 p 13-18 refs (For primary document see N80-13306 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Four major areas of high temperature vibration control technology are examined. The areas discussed are: the measurement and characterization of damping behavior of enamels and glasses and high damping elastomers; the effects of composition on damping behavior of glasses and enamels; the practical design and application of damping treatments in industry and service; and the development of mechanical mechanisms of damping. A.W.H.

N80-13309 Chubu Inst. of Tech., Kasugai (Japan).
REDUCTION METHODS FOR PROBLEMS OF VIBRATION OF ORTHOTROPIC PLATES. PART 1: EXACT METHODS **c39**
T. Sakata *In* SVIC Shock and Vibration Digest, Vol. 11, No. 5 May 1979 p 19-26 refs (For primary document see N80-13306 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Three exact reduction methods for problems of vibration are described. A generalized reduction method is described and used to derive an approximate formula for estimating the natural frequency of an orthotropic plate. The natural frequencies of the isotropic plate are used. They are reduced without solving the differential equation governing free vibration of the orthotropic plate. A.W.H.

N80-13310 Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 11, NUMBER 7
Judith Nagle-Eshelman, ed. Washington DOD Jul. 1979 89 p
(AD-A072745/3) Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

Reviews of vibration analyses in relation to structural design and material tests. Included are discussions on the nonlinear distortion of nondispersive acoustic waves, the behavior of elastometric materials under dynamic loads, and techniques for plastic deformation of structures under impulsive loading. For individual titles, see N80-13311 through N80-13313.

N80-13311 Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
RECENT DEVELOPMENTS FOR THE NONLINEAR DISTORTION OF NON-DISPERSIVE ACOUSTIC WAVES. PART 1: PLANAR WAVES AND THE BASIC METHOD **c71**
J. H. Ginsberg *In* SVIC Shock and Vibration Digest, Vol. 11, No. 7 Jul. 1979 p 3-8 refs (For primary document see N80-13310 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/1

A perturbation procedure for investigating finite amplitude acoustic waves that depend on more than one spatial coordinate is described. The discussion focuses on wave motions that are nondispersive in the linear approximation, in which case amplitude dispersion and self refraction are the primary mechanisms for nonlinear distortion. Planar waves and the basic method are discussed. A.W.H.

N80-13312 General Dynamics Corp., Groton, Conn. General Boat Div.
BEHAVIOR OF ELASTOMETRIC MATERIALS UNDER DYNAMIC LOADS, 2 **c39**
E. C. Hobaica *In* SVIC Shock and Vibration Digest, Vol. 11, No. 7 Jul. 1979 p 11-18 refs (For primary document see N80-13310 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

The properties of rubber and other elastomers when they are subjected to small amplitude sinusoidal stresses. Testing methods and data on dynamic properties are given. A.W.H.

N80-13313 Southwest Research Inst., San Antonio, Tex.
APPROXIMATE TECHNIQUES FOR PLASTIC DEFORMATION OF STRUCTURES UNDER IMPULSIVE LOADING, 2 **c39**
W. E. Bakerm *In* SVIC Shock and Vibration Digest, Vol. 11, No. 7 Jul. 1979 p 19-24 refs (For primary document see N80-13310 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20735 CSCL 20/11

Approximate techniques for plastic deformation of structures under impulsive loading is summarized. Research oriented methods and design oriented methods are described. Several design-oriented methods, utilized by structural designers are examined. A.W.H.

N80-13314 Virginia Univ., Charlottesville.
A STUDY OF THE DISSIPATIVE MECHANISM IN THE FLOW OF SUPERFLUID HELIUM-4 USING CHARGED VORTEX RINGS Ph.D. Thesis
Bruce Michael Guenin 1978 180 p
Avail: Univ. Microfilms Order No. 7928040

A charge vortex ring CVR study of vorticity generated by a flow of superfluid helium-4 at a known superfluid velocity and chemical potential difference is presented. Measurements of the spatial distribution of the CVR currents in the beam are presented and discussed. The interaction between the CVR beam and the neutral vorticity is analyzed with respect to CVR beam attenuation, charge transferred to the neutral vorticity, and free ions produced. Dissert. Abstr.

N80-13315# Committee on Science and Technology (U. S. House).
STANDARD REFERENCE DATA PROGRAM AUTHORIZATION
Washington GPO 1978 98 p refs Hearing before Subcomm. on Sci., Res., and Technol. of the Comm. on Sci. and Technol., 95th Congr., 2d Sess., 9 Feb. 1978
(GPO-25-887) Avail: Subcomm. on Sci., Res. and Technol.

Testimonies delivered and statements received in support of the standard reference data program are presented. R.E.S.

N80-13316*# TriTec, Inc., Columbia, Md.
INDUSTRIAL CAPABILITY TO CHEM-MILL ALUMINUM ALLOY 2219 IN T-37 AND T-87 Final Report
Charles Milewski, Jr. and Kevin C. S. Chen 31 Oct. 1979 15 p
(Contract NAS8-33510)
(NASA-CR-161349) Avail: NTIS HC A02/MF A01 CSCL 13H

Procedures and chemical baths were developed for chem-milling aluminum alloy 2219. Using a series of sample etchings,

it was found that good etching results could be obtained by using 'white plastic for porcelain repair (toluol, xylol, and petroleum distillates)' on top of cellosolve acetate as resist coatings and ferric chloride as on etchant. R.E.S.

N80-13317*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EVALUATION OF CLEANERS FOR PHOTOVOLTAIC MODULES EXPOSED IN AN OUTDOOR ENVIRONMENT Final Report
W. D. Knapp Oct. 1979 17 p refs
(Contract DE-AI01-79ET-20485)
(NASA-TM-79248; E-204; DOE/NASA/20485-79/5) Avail: NTIS HC A02/MF A01 CSCL 13H

Power recovery of silicone encapsulated and glass covered photovoltaic modules, exposed for two years to a suburban environment, was measured after washing with a variety of cleaners including detergents, abrasive soap, and hydrocarbon solvents. Silicone encapsulated modules in operating environments may experience significant power losses or require extensive periodic cleaning. Glass front-faced modules in similar situations are much less affected. Organic hydrocarbon solvents or abrasives were found to be about five times more effective than mild detergents in cleaning encapsulated modules. Author

N80-13318# National Engineering Lab., East Kilbride (Scotland). Systems Engineering Div.
ENERGY SAVING IN INJECTION MOLDING
G. Gardiner Jan. 1979 35 p Presented at Rubber and Plastics Res. Assoc. Seminar, 1 Feb. 1978
(NEL-662) Avail: NTIS HC A03/MF A01

Power consumption in an injection molding plant was studied and tests on an injection molding machine during a specific work cycle were made. The results clearly establish the energy losses which are present in many injection molding plants. By converting the plant to hydraulic drives and centralized hydraulic power supply, most of the losses could be eliminated. Supporting results of tests on a converted injection molding machine operating from a single hydraulic power source, simulating a centralized hydraulic power supply are also included. Author (ESA)

N80-13319*# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
COMPARISON OF CENTRIFUGE AND FREEZING CALORIMETER METHODS FOR MEASURING FREE WATER IN SNOW
R. N. Jones May 1979 44 p refs Sponsored by NASA
(NASA-CR-162504; PB-296321/1; NBSIR-79-1604) Avail: NTIS HC A03/MF A01 CSCL 14B

A comparison of two popular methods; namely, the centrifuge and the freezing calorimeter is presented. Results from measurements over a two-month period in the Colorado mountains in the winter of 1978 indicate serious disagreement between these two methods. Some reasons for the disagreement are presented and verified. This raises some important questions pertaining not only to what the two methods actually measure, but also which methods may be appropriate for particular applications. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

N80-13320 Syracuse Univ., N. Y.
A FILAMENTARY MULTIPOLE MODEL FOR CYLINDRICAL ANTENNAS Ph.D. Thesis
Tzeyang Jason Chou 1979 197 p
Avail: Univ. Microfilms Order No. 7925559

A Taylor series expansion is applied to the Green's function of the vector potential for an arbitrary body resulting in a multipole source representation for the surface current. The method is applied to treat moderately thin wires. The current flowing on the wire surface is represented by a set of electric and magnetic axial filamentary multipole currents. The method of moments is used to solve the current distributions. The quantities of interest such as near field, far field, backscattering cross sections, etc. are then derived. The appropriate end boundary conditions for the tube and flat cap antennas are considered. Two approaches to treat these conditions within the multipole model are presented. Computer programs are developed in FORTRAN 4 to treat (1) single wire with flat caps, (2) parallel tube wires, and (3) skewed tube wires. Dissert. Abstr.

N80-13321 Columbia Univ., New York.
MATHEMATICAL PROBLEMS ARISING FROM PASSIVE INTERMODULATION INTERFERENCE IN COMMUNICATIONS SATELLITES Ph.D. Thesis
Kai Yin Eng 1979 175 p
Avail: Univ. Microfilms Order No. 7924879

The mathematical problems of passive intermodulation (PIM), identified as a potential cause of interference to the ultrasensitive receiver onboard spacecraft are examined. An essential feature of the PIM problem is that the product causing interference is usually of a high order. The general behavior of the high-order intermodulation products (IMP's) is investigated and rate of decrease of the IMP's is shown to depend essentially on the degree of nonlinearity of the transfer function. Some IM output spectra are illustrated by using the Fourier series method of analysis and some hypothetical nonlinearities. It is demonstrated that many IMP's can exist at a particular frequency of interest, resulting in a very complicated output spectrum for the multiple carrier case. The type and order prediction problem is identified as the main problem. Dissert. Abstr.

N80-13322 Wisconsin Univ. - Madison.
ESTIMATION OF THE SPECTRAL MOMENTS AND QUADRATURE CROSS-CORRELATION FUNCTIONS AND THEIR APPLICATION TO TROPOSCATTER SYSTEMS Ph.D. Thesis
Ashok Kumar Gupta 1979 284 p
Avail: Univ. Microfilms Order No. 7918894

Aspects of statistical communication theory and signal processing are applied to troposcatter communications. Some of the techniques proposed require the estimation of the first moment (average frequency) and the third central moment (skew measure) of the spectrum of the received baseband complex process which is assumed to be a heterodyned narrow band Gaussian process when a CW carrier is transmitted. Pursuit of the simplified signal processing of these estimators resulted in distorting one or both quadrature components of the complex process by zero memory nonlinear devices, such as the hard clipper. Both variance and signal to noise ratio of these estimators of the spectral moments for distorted and undistorted quadrature components are computed to evaluate the performance of the proposed alignment techniques under various tropo-channel conditions. The variance of a class of correlation detectors, termed quadrature cross correlation detectors, which cross correlate two zero mean distorted and undistorted Gaussian quadrature components, are discussed.
Dissert. Abstr.

N80-13323 Montana State Univ., Missoula.
A INTRUSIVE SLOTTED CYLINDER ANTENNA ARRAY FOR SUBSURFACE MOISTURE PROFILING Ph.D. Thesis
David Leo Herrick 1979 186 p
Avail: Univ. Microfilms Order No. 7925067

Theoretical analysis and measured performance of an intrusive microwave probe for sensing the distribution of soil moisture from near surface to root zone depths (1-2 m) are presented. The probe consists of a linear array of slot antennas mounted along the axis of a metal cylinder and is intended for borehole installation. Measurements of self and mutual slot antenna admittances are used to derive a discrete depth profile of the soil's complex permittivity. The moisture distribution is then deduced from this permittivity profile by empirical relations. Dissert. Abstr.

N80-13324 Syracuse Univ., N. Y.
A STUDY OF A REACTIVELY LOADED FINITE PLANAR RECTANGULAR WAVEGUIDE ANTENNA ARRAY Ph.D. Thesis

John L. Luzwick 1979 124 p
Avail: Univ. Microfilms Order No. 7925581

The antenna arrays considered have a single waveguide-fed aperture, no complex feed network to all of the apertures, and one reactive load (shorted waveguide) for each remaining aperture. Each antenna is characterized in terms of power gain, bandwidth, and match. Several examples of magnitude pattern synthesis are presented to show antenna pattern limitations for a given antenna geometry and excitation. In addition, an example using a double frequency synthesis procedure is given for reshaping gain versus frequency characteristics in the endfire direction. Numerical techniques (optimization algorithms) are used to find reactive loads for both maximum gain in a specified direction and synthesized pattern. A brief summary is given of the major computer program subroutines used in generating the calculated results. Dissert. Abstr.

N80-13325 Southern Methodist Univ., Dallas, Tex.
RADIATION FIELDS OF DIELECTRIC OPTICAL WAVEGUIDES Ph.D. Thesis
Marion Wayne Scott 1979 143 p
Avail: Univ. Microfilms Order No. 7925674

A method of measuring the far field radiation pattern of dielectric optical waveguides is presented. The patterns of three layer and five layer structures, obtained using this technique, are given. Matching the experimental results with patterns calculated using the theory of layered waveguides determines the geometry and index of refraction profile of the waveguide. Dispersion characteristics and radiation fields of an optical stripline waveguide radiating into free space are calculated. The halfpower beamwidth of the fundamental mode in a plane parallel to the dielectric layers is used as an indication of the degree of optical confinement under the stripe. Plots of the beamwidth versus the various waveguide parameters indicate the parameter values which give the best optical confinement. An approximate, and computationally simpler, method of calculating this beamwidth is also discussed. Dissert. Abstr.

N80-13326 Iowa State Univ. of Science and Technology, Ames.
HARMONIC CURRENT PROPAGATION ON AC SYSTEMS DUE TO HUDC LINKS Ph.D. Thesis
Richard Dean Shultz 1979 140 p
Avail: Univ. Microfilms Order No. 7924271

A method is presented for analyzing characteristic harmonic current propagation into an AC system due to an AC/DC conversion. Frequency dependent models of AC network elements were developed for the appropriate range of frequencies. These models are then assembled into a modified bus impedance matrix for analysis. The methodology was then applied to two different systems and the responses of individual elements and the system as a whole were observed. The harmonic current flows in the system appear to be related to certain characteristics of the system and its elements. Input impedances at harmonic frequencies, the magnitude of shunt capacitances of transmission lines, the size and location of the converters, and the representation of system loads are factors in determining the magnitude of harmonic current flows in system elements. Dissert. Abstr.

N80-13327 Stevens Inst. of Tech., Hoboken, N. J.
AN INVESTIGATION OF THE EFFECTS OF ANALOG AND DIGITAL SYSTEMS ON SIGNAL FIDELITY Ph.D. Thesis
Bahig Mikhail Philobos 1979 142 p
Avail: Univ. Microfilms Order No. 7925054

The distortion of the output of analog and digital filters caused by the deviation of their characteristics from the ideal filter characteristics is presented. Bounds on errors present in the output signals of analog and digital filters are evaluated in terms of the signal's effective bandwidth and energy and the filter's parameters. Design procedures for linear phase analog and digital filters, incorporating these bounds, are obtained. Dissert. Abstr.

N80-13328 Kansas Univ., Lawrence.
DESIGN AND FABRICATION ON MICROSTRIP DISK ANTENNA ARRAYS Ph.D. Thesis
Frank Gary Parks 1979 185 p
Avail: Univ. Microfilms Order No. 7925874

A microstrip array project was conducted to demonstrate the feasibility of designing and fabricating simple, low cost, low sidelobe phased arrays with circular disk microstrip radiating elements. Design data were presented for microstrip elements and arrays including the effects of the protective covers, the mutual interaction between elements, and stripline feed network design. Low cost multilayer laminate fabrication techniques were also investigated. Utilizing this design data two C-band low sidelobe arrays were fabricated and tested: an eight element linear and a sixty-four element planar array. These arrays incorporated stripline Butler matrix feed networks to produce a low sidelobe broadside beam. Dissert. Abstr.

N80-13329 Southern Methodist Univ., Dallas, Tex.
AUTOREGRESSIVE ACQUISITION AND INTERFERENCE-TEST CODING FOR SPREAD SPECTRUM COMMUNICATIONS Ph.D. Thesis
Ahmed Kamel Elhakeem 1979 155 p
Avail: Univ. Microfilms Order No. 7925422

Techniques for acquiring the codes used in Frequency Hopping (FH), Hybrid Frequency Hopping/Time Hopping (FH/TH), and Frequency Hopping/Direct Sequence (FH/DS) spread spectrum systems are presented. Autoregressive Spectral Estimation is employed to recover the FH code, Quadrature Processing is used for the DS code, while the TH gating code is recovered by a simple threshold test used in conjunction with the adaptive filter used for the spectral estimation. A wide margin of spectral estimation errors can be tolerated since an acquisition logic is used to estimate the FH code phase. The hardware implementation is quite simple and while other schemes of serial and parallel search require acquisition times of the order of the code lengths, the proposed techniques require acquisition times only of the order of the shift register generator lengths. Dissert. Abstr.

N80-13330 Wisconsin Univ. - Madison.
STIMULATED THOMSON SCATTERING Ph.D. Thesis
Ross Loren Spencer 1979 152 p
Avail: Univ. Microfilms Order No. 7921580

The theory of stimulated Thomson scattering is investigated both quantum mechanically and classically. Two monochromatic electromagnetic waves of like polarization travelling in opposite directions are allowed to interact for a time with the electrons in a collisionless plasma. With the difference frequency well above the plasma frequency, the rate at which energy is transferred from one wave to the other is calculated quantum mechanically, classically from a fluid theory, and classically from an independent electron theory. The rate is calculated in both the homogeneously broadened limit, and in the inhomogeneously broadened limit. In the unsaturated limit, the three calculations agree. The classical calculations yield the phase shift of the waves due to stimulated Thomson scattering. The fluid theory shows how stimulated Thomson scattering passes into stimulated Raman scattering as the difference frequency approaches the plasma frequency. The independent electron theory shows how the effect saturates due to nonlinear Landau damping. Dissert. Abstr.

N80-13331 California Univ., Los Angeles.
DIGITAL DETECTION BY DIGITAL SIGNAL PROCESSING TECHNIQUES Ph.D. Thesis
Sam Reisenfeld 1979 319 p
Avail: Univ. Microfilms Order No. 7926054

A digital receiver is modeled in which digital detection is accomplished by digital signal processing. A fundamental limitation of the achievable detection performance is the addition of quantization noise by the analog to digital converter to the detection statistic. The limitations of the error probability performance of a detector structurally constrained to operate upon L quantized samples of the filtered channel observation waveform are analytically derived. For a fixed quantizer, the minimum error probability post quantization signal processing structure is derived. The minimum error probability quantizer and performance are found, and these results are compared to the results for the case of the quantizer which maximizes the signal to noise ratio of the detection statistic. Dissert. Abstr.

N80-13332 Yale Univ., New Haven, Conn.
PARAMETER ESTIMATION NARROW-BAND PROCESSES WITH ARRAYS Ph.D. Thesis
1979 164 p

Avail: Univ. Microfilms Order No. 7927219

Array processing of narrow band signals in noise is examined with emphasis on the estimation of delay and bearing. Barankin bounds are derived for situations in which ambiguity errors are important. For sinusoidal signals the results indicate that sensor spacings of more than a half wavelength lead to unnecessary errors. In some (but not all) situations sensor spacings below a half wavelength also result in performance degradations. Hence the conventional half wavelength setting has a strong claim to optimality. For Gaussian signals and wide sensor spacing one finds that the Barankin bound exhibits a sharp threshold effect at a critical signal to noise ratio where ambiguity errors disappear. Various procedures for reducing ambiguity errors are discussed. Dissert. Abstr.

N80-13333*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

OPERATIONAL PROCEDURES FOR GROUND STATION OPERATION: ATS-3 HAWAII-AMES SATELLITE LINK EXPERIMENT

Kenji Nishioka and Emanuel H. Gross Dec. 1979 31 p

(NASA-TM-81155; A-8011) Avail: NASA. Ames Research Center, Moffett Field, Calif. 94035 CSCL 17B

Hardware description and operational procedures for the ATS-3 Hawaii-Ames satellite computer link are presented in basic step-by-step instructions. Transmit and receive channels and frequencies are given. Details such as switch settings for activating the station to the sequence of turning switches on are provided. Methods and procedures for troubleshooting common problems encountered with communication stations are also provided. R.E.S.

N80-13334*# Axiomatix, Los Angeles, Calif.

ORBITER CIU/IUS COMMUNICATIONS HARDWARE EVALUATION Summary Report no. 2

Gaylord K. Huth 30 Nov. 1979 411 p refs

(Contract NAS9-15409)

(NASA-CR-160404; R7911-5) Avail: NTIS HC A18/MF A01 CSCL 17B

The DOD and NASA inertial upper stage communication system design, hardware specifications and interfaces were analyzed to determine their compatibility with the Orbiter payload communications equipment (Payload Interrogator, Payload Signal Processors, Communications Interface Unit, and the Orbiter operational communications equipment (the S-Band and Ku-band systems). Topics covered include (1) IUS/shuttle Orbiter communications interface definition; (2) Orbiter avionics equipment serving the IUS; (3) IUS communication equipment; (4) IUS/shuttle Orbiter RF links; (5) STDN/TDRS S-band related activities; and (6) communication interface unit/Orbiter interface issues. A test requirement plan overview is included. A.R.H.

N80-13335# Hughes Aircraft Co., Culver City, Calif. Radar Microwave Lab.

***EQUIVALENCE PRINCIPLE AS APPLIED TO CONICAL ARRAYS* Final Report**

A. T. Villeneuve Apr. 1979 2 p

(Contract N00014-78-C-0617)

(AD-A073384; HAC-Ref-E3804) Avail: NTIS HC A02/MF A01 CSCL 09/5

The program 'Equivalence Principle As Applied To Conical Arrays' has been successfully completed. The equivalence principle *pattern synthesis technique has been used to provide aperture* distributions for an experimental conical array. The array consisted of thirty-seven crossed-slot elements on a cone of half-angle *10.25 degrees and was operated at 3.185 GHz. Radiation patterns* were measured for two beam pointing directions, one 50 deg. *from the cone tip and the second normal to the conical surface.* Excellent agreement was obtained between measured patterns and calculated patterns. It is concluded that the technique can *be used successfully to synthesize radiation patterns from arrays* on conical and other curved surfaces. GRA

N80-13336# *Rome Air Development Center, Griffiss AFB, N.Y.*

POSITIONAL ERROR ANALYSIS, A-10 AIRCRAFT ON *THREE-AXIS GROUND MOUNT* *Technical In-house Report,* Jun. 1977 - Dec. 1978

Jerome P. Scheiderich and William J. Bocchi Jul. 1979 71 p (AF Proj. 2114)

(AD-A073600; RADC-TR-79-220) Avail: NTIS HC A04/MF A01 CSCL 13/9

This report describes a test that was performed to determine the truth orientation of an A-10 aircraft mounted on a Scientific Atlanta Inc., Model PAEA-85 three-axis positioner at the Rome Air Development Center Newport Antenna Test Annex, and to estimate the errors inherent in using the aircraft positioning system in the process of antenna pattern testing. The report describes the following aspects of this effort: (1)Establishment of a reference coordinate system for the aircraft, and alignment of the aircraft on the positioner, (2) Description of the inclinometer system used for determining the aircraft orientation, (3) Test procedures, (4) Discussion of results, (5) Summary of errors, and (6) Conclusions and recommendations for the guidance of personnel using the system for aircraft antenna pattern testing. The total system error was determined to be less than 0.683 degrees for a pitch maneuver, and less than 0.533 degrees for a roll maneuver. GRA

N80-13337# Lee (J. S.) Associates, Inc., Arlington, Va.

ERROR PERFORMANCE OF DIFFERENTIALLY COHERENT DETECTION OF BINARY DPSK DATA TRANSMISSION ON THE HARD-LIMITING SATELLITE CHANNEL Final Report

Jhong Sam Lee, Robert H. French, and Yoon K. Hong Aug. 1979 101 p refs

(Contract N00014-77-C-0056)

(AD-A073377; JTR-79-06) Avail: NTIS HC A06/MF A01 CSCL 17/2

The error performance of a differentially coherent detection method of binary differential phase-shift keying (DPSK) system operating over a hard-limiting satellite channel is derived. The main objective of our derivation was to observe the extent of error rate degradation of a DPSK system due to unequal power levels and noise correlations between the two adjacent time slot pulses. In practice, the power imbalance, or equivalently SNR imbalance, is induced by such phenomena as intersymbol interference and/or errors in phase delay in the 'one-bit-delayed' reference input. The noise correlation is a practical assumption since the noise is necessarily band limited in the system. Error probabilities are given as a function of uplink SNR with different levels of SNR imbalances and different downlink SNR as parameters. It is discovered that, while SNR imbalance affects error performance, the probability of error is independent of noise correlation if the symbol probabilities are equal. GRA

N80-13338# Massachusetts Inst. of Tech., Cambridge. Information and Decision Systems Lab.

DYNAMIC BEHAVIOR OF SHORTEST PATH ROUTING ALGORITHMS FOR COMMUNICATION NETWORKS

Dimitri P. Bertsekas Aug. 1979 52 p refs

(Contract N00014-75-C-1183; ARPA Order 3045)

(AD-A073487; LIDS-P-931) Avail: NTIS HC A04/MF A01 CSCL 17/2

Several proposed routing algorithms for store and forward communication networks, including one currently under implementation in the ARPANET, *route mesages along shortest paths* computed by using some set of link lengths. When these lengths depend on current traffic conditions as they must in an adaptive *algorithm, dynamic behavior questions such as stability, convergence,* and speed of convergence are of interest. This paper is the first attempt to analyze systematically these issues. It is *shown that minimum queuing delay path algorithms tend to* exhibit violent oscillatory behavior in the absence of a damping mechanism. Several easily implementable damping schemes are *proposed and analyzed by using nonlinear stability theory* techniques. GRA

N80-13339# Guidance Systems, Inc., Andover, Mass.

OVERLAPPED SUB-ARRAY SCANNING ANTENNA STUDY *Final Report*

G. Ploussios Griffiss AFB, N.Y. RADC May 1979 70 p refs

(Contract F19628-78-C-0069; AF Proj. 4600)

(AD-A070939; RADC-TR-79-101) Avail: NTIS HC A04/MF A01 CSCL 09/5

This report refers to an investigation of new phased array techniques using overlapping multiple beam elements. It is shown that this technique can be applied to a wide variety of electronically

scanned system requirements. Two designs, one for limited scan and the other for wide angle scan with a minimum number of elements and phase shifters were selected for the reported computer analysis. The results indicate extremely low sidelobe levels over most of the angular sector while limiting the close-in sidelobes to no more than -20 dB and grating lobe levels to peak values of about -14 dB for some scan locations. The limited scan design utilizes 18 eight-port Bulter matrices, 18 phase shifters, and 9 SP2T switches to achieve 20 BW's of a + or - 10 deg scan. The wide-angle design provides 90 BW's of scan + or - 45 deg) with 26 eight-port matrix elements, 26 phase shifters and 26 SP4T switches. The analysis of the new scan array technique indicates that the array performance can be further improved at the cost of additional elements and element complexity. GRA

N80-13340# SRI International Corp., Menlo Park, Calif.
LIDAR OBSERVATIONS AT 0.7-MICROMETERS AND 10.6-MICROMETERS WAVELENGTHS DURING DUSTY INFRARED TEST I (DIRT I)
Jan E. vanderLaan Jul. 1979 57 p
(Contract DAAG29-77-C-0001)
(AD-A073330; SRI-TR-3; ARO-13833.4-GS) Avail: NTIS HC A04/MF A01 CSCL 17/5

This technical report describes lidar measurements and results using a 10.6 micrometers lidar and the Mark 9 (0.7 micrometers) lidar systems during the Dusty Infrared Test I (DIRT I). Transmission comparisons are made between the two wavelengths with artillery barrages, TNT explosions, and oil/rubber fire-generated dust and smoke clouds in a test zone midway (1 km) along the lidar path. A target at the end of the lidar path provided a reference backscatter return for the transmission measurements. Backscatter properties of the dust and smoke clouds are also discussed. Results of the DIRT I program indicate that the broad particle size distribution present in the dust generated produced little if any wavelength dependent transmission effects. The few observed exceptions where greater 10.6 micrometers transmission is indicated generally can be explained by the presence of wavelength-dependent smoke along the optical path, which is also generated by the detonations. Backscatter-to-transmission relationships are grossly related but, in general, are quite nonlinear, as can be expected when multiple and specular scatter by the large particles, as well as strong attenuations, are involved. The oil/rubber fire generated dense black smoke that was totally opaque to the 0.7 micrometers lidar, while the 10.6 micrometers transmission measurements indicate a worse-case transmission of approximately 6%. GRA

N80-13341# California Univ., Livermore. Lawrence Livermore Lab.
EFFICIENT NUMERICAL PROCEDURE FOR MODELING ANTENNAS OVER LOSSY EARTH
G. J. Burke and J. N. Brittingham 12 Jul. 1979 9 p refs
Presented at AGARD Meeting, Spatind, Norway, 10 Sep. 1979
(Contract W-7405-eng-48)
(UCRL-82121; CONF-790908-1) Avail: NTIS HC A02/MF A01

A procedure is described which permits the direct use of the Sommerfeld integral in such a way that is fast, without compromising accuracy, and permits modeling antennas very close to the interface. An efficient interpolation technique is used to obtain the Sommerfeld integral values from a precomputed table. Also, the dominant singular component of the field is separated out and the integration of this component over the current is done analytically to permit evaluation for wires very close to the interface. DOE

N80-13342# Electro Magnetic Applications, Inc., Albuquerque, N. Mex.
RECEIVING PROPERTIES OF THE SMALL ANNULAR SLOT ANTENNA
D. E. Merewether, R. B. Cook, and R. Fisher 29 Sep. 1978 19 p refs
(Contract EY-76-C-04-0789)
(SAND-78-7067) Avail: NTIS HC A02/MF A01

An analytical formula for the effective height of an annular slot antenna is determined using the reciprocity theorem. The result generalizes the previously available monochromatic result and yields an equivalent circuit valid for computing the transient response of the smaller annular slot antenna. This method is compared with finite difference predictions of equivalent circuit parameters. DOE

N80-13343# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer Science.
BRITISH POST OFFICE VIEWDATA INTERFACING TO A DATA COMMUNICATION NETWORK
A. T. Davies Aug. 1978 25 p refs
(NPL-DNACS-1/78) Avail: NTIS HC A02/MF A01

The transmission of textual and simple graphical information in serial form via modems connected to the P.O. Public Switched Telephone Network (VIEWDATA) is described. The system is interactive, making use of a keyboard for input, and usually a color television receiver modified to accept and display teletext type information for display. It provides for on line access to a data base of useful information for the general public and business community. The interfacing of VIEWDATA to the N.P.L. data communication network is described together with some consequences of the differences between terminal types and communication conventions. J.M.S.

N80-13344# Standard Elektrik Lorenz A.G., Stuttgart (West Germany). Unternehmensgruppe Nachrictentechnik.
FEASIBILITY STUDY FOR SPACELAB USER PROGRAM: PROPAGATION OF ELECTROMAGNETIC WAVES Final Report
Andreas Bethmann, Georg Herzog, Peter Kreutzer, Dietrich Rother, Rolf Stiefel, and Kurt Taenzer Bonn Bundesmin. fuer Forsch. u. Technol. Oct. 1978 192 p refs In GERMAN; ENGLISH summary
(Contracts BMFT-WRT-1076; DFVLR-01-QV-376)
(BMFT-FB-W-78-10) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 40.35

The feasibility of Spacelab experiments concerning electromagnetic wave propagation was studied. Propagation measurements between 10 KHz and 100 KHz were considered. Equipment and technology limitations are defined, following a survey of user requirements, state of the art, and near-term development possibilities. The influence of these factors on terrestrial and satellite transmission capabilities is noted. The characteristics of frequency dependence on propagation mode are shown. Finally, the availability of suitable ground stations to assist in these experiments as well as the availability of measuring devices and antennas are discussed. A system is then proposed that consists of pallet mounted steerable spacecraft antennas, a set of receivers, and means for automatic signal processing along with onboard data recording. Author (ESA)

N80-13345# Defence Research Information Centre, Orpington (England).
THE PROPAGATION OF VLF WAVES THROUGH THE INTERIOR OF THE EARTH
W. Bitterlich (Innsbruck Univ.) London Apr. 1979 41 p refs
Trans. into ENGLISH from Acta Phys. Austriaca (Austria), v. 26, no. 2/3, 1967 p 183-210 Sponsored by Procurement Executive Min. of Defence
(DRIC-Trans-5572; BR68392) Avail: NTIS HC A03/MF A01

The propagation of low frequency electromagnetic waves through solid media (interior of the Earth) was studied in theory and through experiments in the frequency range of 3 to 30 kHz/sec. The instruments used are described. The influence of the electrical parameters of rock on the wave propagation and their measurement is also discussed. Initial results are given and further investigations are suggested. Author (ESA)

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N80-13346 Drexel Univ., Philadelphia, Pa.
A FUNCTIONAL SIMULATION SYSTEM FOR MSI AND LSI SYSTEMS Ph.D. Thesis

Edward Lee Hepler 1979 147 p
Avail: Univ. Microfilms Order No. 7918484

The implementation of a functional digital logic simulation system is considered. Four programs which perform the simulation process are described. The first program compiles logic element descriptions which have been written in a high level hardware design language into tables which describe the function of each logic element. The logic elements which have been described may then be interconnected to form a circuit to be simulated. The second program compiles a network description of the circuit into a set of tables which includes each element's inputs and each signal's fanout. The third program uses the tables produced by the first two programs, along with input stimuli provided by the user to simulate the circuit functionally. The simulator is table driven and uses selective trace. Output from the simulation program may be formatted for increased readability by a fourth program. An example circuit, which uses typical MSI modules, is simulated. Dissert. Abstr.

N80-13347 George Washington Univ., Washington, D. C.
A NEW WEIGHTING COEFFICIENT FOR ADAPTIVE STATE ESTIMATION Ph.D. Thesis
Michael George Harris 1979 97 p
Avail: Univ. Microfilms Order No. 7924364

An adaptive filter for the continuous parameter vector case, using a finite bank of filters weighted by coefficients based on an estimated distance in the parameter space (rather than approximations to the conditional probability) is presented. The method requires the availability of an estimate of the parameter for use in the computation of the weighting coefficient. A description of an application to an aircraft estimation problem during some of the phases of the final approach is given. Results obtained from a digital simulation of the aircraft dynamics, and the adaptive filter using (microwave landing system) guidance data and on-board sensors are presented. A comparison of the adaptive filter and the least mean square error filter using simulation results is also made. Dissert. Abstr.

N80-13348 Carnegie-Mellon Univ., Pittsburgh, Pa.
PROCESS ORIENTED DESIGN AIDS FOR VERY LARGE SCALE INTEGRATED CIRCUITS Ph.D. Thesis
Masaaki Kamiya 1979 153 p
Avail: Univ. Microfilms Order No. 7919146

Process oriented circuit design aids to simulate the more complex circuits, and still accurately reflect the smaller size MOS transistor characteristics are developed. Precise device modeling for small size MOSFET's, process characterization in connection with device model parameters, and development of the presently available high level LSI logic circuit simulator (MOTIS), compatible with a general purpose circuit analysis program such as SPICE, are among the topics discussed. A narrow channel effect to complete the device model for small size MOSFET's is introduced along with automated model parameter extraction computer routines, associated with IC process characterization capable of accurate simulation of circuit functions from IC fabrication process and mask layout information alone. The development of MOTIS so that it can accurately simulate LSI logic circuits consisting of various size MOSFET's, reflecting not only short-channel effects but also narrow channel effects is included. The capability to simulate IC's with process and mask layout as input description is provided. Dissert. Abstr.

N80-13349 Michigan Univ., Ann Arbor.
CHARACTERISTICS OF TRAPATT AMPLIFIERS Ph.D. Thesis
Richard Keith Mains 1979 194 p
Avail: Univ. Microfilms Order No. 7925189

Computer programs were developed to separately simulate the TRAPATT diode and the circuit, and the two were coupled to perform device-circuit interaction simulations. The device program solves Poisson's equation, the continuity equation, and the expressions for current in one dimension. The circuit program simulates the traveling waves in a slug-tuned coaxial line, and also solves for voltages and currents in lumped element networks using the state variable technique. A circuit experimentally found to achieve broadband amplification is simulated. The device waveforms are shown over the frequency band of operation, and the mechanisms causing the gain to fall off above and below the center frequency are explained. A coaxial circuit experimentally found to operate as a TRAPATT oscillator is simulated as a narrow band locked oscillator. From an extrapolation of these results, a prediction of the maximum possible bandwidth achievable in a TRAPATT amplifier is given. Dissert. Abstr.

N80-13350 Columbia Univ., New York.
THEORETICAL AND EXPERIMENTAL STUDIES OF PERIODIC CURRENTS AND POTENTIALS IN ELECTROPLATING AND IN FAST KINETICS ON A ROTATING DISK ELECTRODE Ph.D Thesis
Krishnan Viswanathan 1979 136 p
Avail: Univ. Microfilms Order No. 7924996

A systematic investigation of mass transfer rates to a rotating disk electrode under periodic currents and potentials is presented. Included are: (1) A numerical solution was obtained for mass transfer to a rotating disk electrode under pulsed current conditions; (2) A method based on a combination of pulsed electrolysis and stirring was developed to study fast electrode reactions; (3) A general solution was derived for the mass transfer to a rotating disk electrode under periodic currents; (4) A numerical solution was presented to calculate the instantaneous current density under pulsed potential conditions for intermediate and large cycle times; (5) The calculation of the maximum electrolysis rates under intermittent potential conditions was discussed; and (6) A calculation was made on the current efficiencies when two competing but irreversible reactions take place at the electrode surface under pulsed current conditions. Dissert. Abstr.

N80-13351 City Univ. of New York, N. Y.
ON THE DESIGN AND REALIZATION OF TWO DIMENSIONAL DIGITAL FILTERS Ph.D. Thesis
Bu-Chin Wang 1979 174 p
Avail: Univ. Microfilms Order No. 7923775

A two-dimensional rectangular digital filter class is presented. Design methods applicable to this class of filter are presented and illustrated by several examples. A real-time parallel processing hardware realization method for 2-D finite-impulse-response and infinite-impulse-response filters was proposed and illustrated by examples. The realization of filters of high order was made possible by hardware saving techniques, such as the replacement of multipliers by ROM's. In the case of linear phase FIR filters, the additional techniques of system function factorization and of code conversion leads to further hardware saving. Two high-speed processing methods, one using section-by-section data processing and the other using microprocessor replacement of single hardware channels, were discussed. Future applications of 2-D parallel processors were described. Dissert. Abstr.

N80-13352 Oklahoma Univ., Norman.
COUNT STATE ANALYSIS OF A DIGITAL PHASE LOCKED LOOP Ph.D. Thesis
Joseph Herman Wenzel 1979 262 p
Avail: Univ. Microfilms Order No. 7925647

A summary is presented which considers the application of research on digital phase locked loops to the optimized design of an FM demodulator for 10.7 Mhz which employs synchronization to minimize digital jitter. Possible extensions of this research are discussed. Dissert. Abstr.

N80-13353 Oklahoma Univ., Norman.
FAULT TEST GENERATION FOR SEQUENTIAL CIRCUITS: A SEARCH DIRECTING HEURISTIC Ph.D. Thesis
Kofi Emmanuel Torku 1979 185 p
Avail: Univ. Microfilms Order No. 7923790

The use of Petri nets to model the register transfers and change of control states in a sequential machine described in a Computer Hardware Description Language (CHDL) with the aim of guiding state space searches is proposed. Each fault to be detected defines a set of goal nodes for the state space search. These goal nodes together with a CHDL description of the circuit are used to generate a Petri net. Some portions of this process are invariant with respect to the goal states, depending entirely on the CHDL description. Four case studies are presented to test the effectiveness of the guidance mechanism. The results

show that the developed model is a promising tool that can be used in fault test set generation in complex sequential circuits.
Dissert. Abstr.

N80-13354 Southern Methodist Univ., Dallas, Tex.
TWO-DIMENSIONAL SEQUENTIAL ALGORITHMS FOR IMAGE RESTORATION AND ENHANCEMENT Ph.D. Thesis
John Andrew Jesudoss Rajan Ponnusamy 1979 109 p
Avail: Univ. Microfilms Order No. 7925421

The development of a mathematical model for restoration and enhancement of noisy images is described. Two spatially invariant two-dimensional Markov models are developed assuming separable, exponential, diamond symmetric and circularly symmetric image correlation functions. A sequential minimum variance estimation algorithm for a discrete two-dimensional image field modeled by a nonsymmetric half-plane model is derived. A modification of the algorithm to facilitate in-place computation is presented and its implementation discussed. Approximation techniques to reduce the processing time and memory requirements are presented. Dissert. Abstr.

N80-13355 Syracuse Univ., N. Y.
DETECTION AND MMSE ESTIMATION OF NONLINEAR MEMORYLESS FUNCTIONALS OF RANDOM PROCESSES USING THE VOLTERRA FUNCTIONAL EXPANSION Ph.D. Thesis
Richard Jos Kenefic 1979 200 p
Avail: Univ. Microfilms Order No. 7925641

A Volterra functional expansion is derived for the likelihood ratio used in the detection of a nonlinear memoryless functional of a random process. This expansion is reduced to well known results for the special case of detection of a Gaussian process. For the case of detection of a nonlinear memoryless functional of a stationary Gaussian random process, it is shown that the likelihood ratio has an asymptotic form for which performance can be obtained provided the nonlinearities and processes satisfy Sun's theorem. Dissert. Abstr.

N80-13356 Yale Univ., New Haven, Conn.
RESONANT RAMAN SCATTERING FROM ELECTRON-PHONON COUPLED MODES IN 3-V SEMICONDUCTORS Ph.D. Thesis
Roger Lee Farrow 1979 278 p
Avail: Univ. Microfilms Order No. 7927624

First-order Raman scattering in GaSb, InSb, and InAs was investigated for laser wavelengths near the E sub 1 and E sub 1 + delta sub 1 L-direction band gaps. At 90 K the intensity of the symmetry-forbidden LO peak in p-type GaSb and InSb was observed to increase rapidly as resonance was approached, accompanied by the appearance of a strong scattering background close to resonance. In addition, the LO lineshape became distorted when the background intensity was present, resembling the interference lineshapes described by Fano for interacting discrete-continuum scattering. Far above resonance, the phonon peak had a narrow, Lorentzian lineshape and the background intensity was absent. Two-phonon resonant Raman scattering in GaSb was investigated in an attempt to observe iterated electron-one-phonon contributions to second-order scattering at the E sub 2 and E sub 1 + delta sub 1 gaps. Dissert. Abstr.

N80-13357 Louisiana State Univ. and A&M Coll., Baton Rouge.
AN EXPLICIT STATE MODEL OF A SYNCHRONOUS MACHINE - TRANSFORMER - SCR BRIDGE UNIT Ph.D. Thesis
Farrokh Shokooh 1979 105 p
Avail: Univ. Microfilms Order No. 7927547

A rigorous mathematical model of a synchronous machine-transformer-thyristor bridge unit is presented in an explicitly expressed state space form with coefficients which are explicit functions of conventional parameters. The use of the model is demonstrated by considering the charging circuit of a high power pulse generating system as the dc network. An illustrative set of simulation results is shown from which relevant information is obtained. Comparison of the simulation results of the full order model and approximate models shows that the system can be accurately represented by a third order reduced model for the short term response and by a second order reduced model for the long term response. The results also show that the harmonics contents of the machine line currents are reduced by using a delta-Y or Y-delta transformed connection. Finally, it is found that the effect of the transformer magnetization current is negligible. Dissert. Abstr.

N80-13358 Minnesota Univ., Minneapolis.
ANALYSIS OF THE ANODE BOUNDARY LAYER OF A HIGH PRESSURE-HIGH CURRENT ARC Ph.D. Thesis
Horia Alexander Dinulescu 1979 246 p
Avail: Univ. Microfilms Order No. 7926116

The detailed structure of the anode boundary layer was investigated by solving the nonequilibrium plasma conservation equations. The plasma conservation equations for the arc as a whole were derived from Boltzmann's kinetic theory. The solution of the anode boundary layer equations was obtained by a numerical procedure with the aid of a FORTRAN computer program. Among the most significant findings are the occurrence of a negative anode potential fall and the counter-current motion of the positive ions in the immediate vicinity of the anode. The variation within the boundary layer of the species temperature, electric field, positive current, charge carrier number, as well as various transport properties employed in the conservation equations are given in graphical form for five values of the arc current density in the range from 600 A/squared cm to 3000 A/squared cm. Dissert. Abstr.

N80-13359*# Hughes Aircraft Co., Newport Beach, Calif. Solid State Products Div.
DESIGN, PROCESSING AND TESTING OF LSI ARRAYS, HYBRID MICROELECTRONICS TASK Final Report, 28 Sep. 1978 - 28 Sep. 1979
R. P. Himmel, S. M. Stuhlbarg, R. G. Ravetti, P. J. Zulueta, and C. W. Rothrock 15 Oct. 1979 122 p refs
(Contract NAS8-32607)
(NASA-CR-161337; FR-79-92-1187; HAC-E07711) Avail: NTIS HC A06/MF A01 CSCL 09C

Mathematical cost models previously developed for hybrid microelectronic subsystems were refined and expanded. Rework terms related to substrate fabrication, nonrecurring developmental and manufacturing operations, and prototype production are included. Sample computer programs were written to demonstrate hybrid microelectric applications of these cost models. Computer programs were generated to calculate and analyze values for the total microelectronics costs. Large scale integrated (LST) chips utilizing tape chip carrier technology were studied. The feasibility of interconnecting arrays of LSU chips utilizing tape chip carrier and semiautomatic wire bonding technology was demonstrated. R.C.T.

N80-13360*# LinCom Corp., Pasadena, Calif.
SHUTTLE GPS R/PA CONFIGURATION AND SPECIFICATION STUDY Final Report
R. W. D. Booth 30 Oct. 1979 56 p Sponsored in part by Rockwell Intern., Downey, Calif.
(Contract NAS9-15815)
(NASA-CR-160396; TR-1080-1779) Avail: NTIS HC A04/MF A01 CSCL 09C

Changes in the technical specifications for a global positioning system (GPS) receiving system dedicated to space shuttle use are presented. Various hardware functions including acquisition, tracking, and measurement are emphasized. The anti-jam performance of the baseline GPS systems are evaluated. Other topics addressed include: the impact on R/PA design of the use of ground based transmitters; problems involved with the use of single channel tests sets; utility of various R/PA antenna interconnections topologies; the choice of the averaging interval for delta range measurements; and the use of interferometry techniques for the computation of orbiter attitude were undertaken. R.C.T.

N80-13361*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF 22.4-kW NONLAMINATED-FRAME dc SERIES MOTOR WITH CHOPPER CONTROLLER Final Report
John R. Schwab Sep. 1979 25 p refs
(Contract EC-77-A-31-1044)

(NASA-TM-79252; DOE/NASA/1044-79/4; E-163) Avail: NTIS HC A02/MF A01 CSCL 09C

Performance data obtained through experimental testing of a 22.4 kW traction motor using two types of excitation are presented. Ripple free dc from a motor-generator set for baseline data and pulse width modulated dc as supplied by a battery pack and chopper controller were used for excitation. For the same average values of input voltage and current, the motor power output was independent of the type of excitation. However, at the same speeds, the motor efficiency at low power output (corresponding to low duty cycle of the controller) was 5 to 10 percentage points lower on chopped dc than on ripple free dc. The chopped dc locked-rotor torque was approximately 1 to 3 percent greater than the ripple free dc torque for the same average current. J.M.S.

N80-13362*# TRW Defense and Space Systems Group, Redondo Beach, Calif. Power Conversion Electronics Dept.

HEAT PIPE COOLED POWER MAGNETICS Final Report

M. S. Chester Dec. 1979 176 p Revised

(NASA-CR-159659; TRW-33572-6001-RU-00) Avail: NTIS HC A09/MF A01 CSCL 09A

A high frequency, high power, low specific weight (0.57 kg/kW) transformer developed for space use was redesigned with heat pipe cooling allowing both a reduction in weight and a lower internal temperature rise. The specific weight of the heat pipe cooled transformer was reduced to 0.4 kg/kW and the highest winding temperature rise was reduced from 40 C to 20 C in spite of 10 watts additional loss. The design loss/weight tradeoff was 18 W/kg. Additionally, allowing the same 40 C winding temperature rise as in the original design, the KVA rating is increased to 4.2 KVA, demonstrating a specific weight of 0.28 kg/kW with the internal loss increased by 50W. This space environment tested heat pipe cooled design performed as well electrically as the original conventional design, thus demonstrating the advantages of heat pipes integrated into a high power, high voltage magnetic. Another heat pipe cooled magnetic, a 3.7 kW, 20A input filter inductor was designed, developed, built, tested, and described. The heat pipe cooled magnetics are designed to be Earth operated in any orientation. Author

N80-13363# McDonnell-Douglas Astronautics Co., St. Louis, Mo.

RELIABILITY TEST AND EVALUATION OF MIL-M-38510 LINEAR MICROCIRCUITS Final Technical Report, Jul. 1976 - Nov. 1978

Roy C. Maurer Griffiss AFB, N.Y. RADC Jul. 1979 380 p (Contract F30602-76-C-0371; AF Proj. 2338)

(AD-A073455; RADC-TR-79-165) Avail: NTIS HC A17/MF A01 CSCL 09/5

The objective of this effort is to provide analysis and evaluation of high reliability linear microcircuits to assure adequate test methods, reliability prediction and specification for high reliability Air Force Electronics. Data from this effort including processing information, materials, design characteristics, electrical measurements, temperature coefficients, stabilities, application information, test methods, burn-in procedures, specification, and reliability data will be used by the Government to assure high reliability in systems using these devices. GRA

N80-13364# IBM Watson Research Center, Yorktown Heights, N.Y.

STUDY OF THE PHYSICS OF INSULATING FILMS AS RELATED TO THE RELIABILITY OF METAL-OXIDE SEMICONDUCTOR DEVICES Final Technical Report, 16 May - 30 Jun. 1978

Z. A. Weinberg, G. W. Rubloff, E. Bassous, J. M. Aitken, and D. J. DiMaria Griffiss AFB, N.Y. RADC Apr. 1979 185 p refs (Contract F19628-76-C-0249; ARPA Order 2180; AF Proj. 2180)

(AD-A073300; RADC-TR-79-117; Scientific-4) Avail: NTIS HC A09/MF A01 CSCL 09/1

These papers discuss the effects of radiation, heat treatment, thickness, measuring temperature and impurity content on the electron trapping characteristics of SiO2. The results of a comprehensive study of the photo conductivity and photo transmission of SiO2 are also included that make it possible to determine the band gap. The generation of donor states near the Si-SiO2 interface is described with a discussion of two alternate mechanisms involving excitons or hydrogen diffusion. GRA

N80-13365# Rockwell International Science Center, Thousand Oaks, Calif.

HETEROJUNCTION MATERIALS AND CHARACTERISTICS Final Report, 1 Mar. 1978 - 28 Feb. 1979

D. L. Miller and J. S. Harris May 1979 30 p refs (Contract N00014-78-C-0330)

(AD-A073792; SC5158.2FR) Avail: NTIS HC A03/MF A01 CSCL 09/1

Molecular beam epitaxy was used to provide samples for extremely abrupt GaAs/GaAlAs heterojunctions for AES profiling of the interface and ESCA measurements of the AlAs valence band structure. The latter samples consist of MBE AlAs layers covered with 50A to 100A of GaAs as protection against oxidation. MBE growth of n-type AlGaAs was studied also. N-type AlGaAs was produced although all the n-type conducting AlGaAs layers grown by MBE had low activation of the dopant (2%-40%) and relatively low room temperature mobilities (650 cu cm sq /v-sec to 1200 cu cm sq /v-sec). It was found that Al source design and background vacuum were important influences on the quality of n-type AlGaAs produced. Some initial measurements were made on the electrical properties of n-GaAs/n-AlGaAs and n-GaAs/n-AlGaAs/n-GaAs structures. I-Vf measurements on n-n structures at room temperatue showed no deviations from ohmic behavior, while C-V measurements on n-n-n structures were hampered by trapping effects in the AlGaAs. GRA

N80-13366# Mission Research Corp., Albuquerque, N. Mex.

EXPERIMENTAL METHODS FOR THE CHARACTERIZATION OF MULTICONDUCTOR CABLE SYSTEMS Final Report

Howard M. Fowles, Ashok K. Agrawal, Larry C. Scott, and Larry Simpson Mar. 1979 123 p refs (Contract F29601-77-C-0040; AF Proj. 1209)

(AD-A073767; AMRC-R-120; AFWL-TR-78-82) Avail: NTIS HC A06/MF A01 CSCL 09/1

This report presents the results of an experimental investigation of pulse propagation on cross-sectional inhomogeneous multiconductor cable systems. Time domain and frequency domain measurement techniques are described and verified. The modal analysis of a 5-wire branched cable and the common mode analysis of a simple cable network are given in the time domain and verified experimentally. Some practical applications of the results of this study to measurements of multiconductor transmission line characteristics in situ are discussed. GRA

N80-13367# Virginia Univ., Charlottesville. School of Engineering and Applied Science.

DESIGN AND TESTING OF HIGH PERFORMANCE BRUSHES Annual Summary Report, 1 Jul. 1978 - Jun. 1979

Doris Kuhlmann-Wilsdorf Jun. 1979 33 p refs (Contract N00014-76-C-1009)

(AD-A073593; UVA/525324/MS79/102) Avail: NTIS HC A03/MF A01 CSCL 13/9

Electrical brushes made of very fine metal fibers have been made and tested. The results are most promising. Additionally the surface films on silver graphite brushes have been investigated. These appear to consist of a thicker layer of lubrication material and a thinner layer which presumably is a very thin layer of oxide and/or water. The former layer is subject to build-up and destruction in the course of running the brushes. A theory was made which is consistent with observations of fiber brushes. GRA

N80-13368# Honeywell, Inc., Hopkins, Minn. Defense Systems Div.

DEVELOPMENT OF TWO MONOLITHIC INTEGRATED CIRCUITS AND A 10-kHz TAPE AUTOMATED BONDED (TAB) HYBRID MICROCIRCUIT OSCILLATOR

Bernard Goblish and Kenneth Ceola Feb. 1979 182 p refs (Contract DAAG39-77-C-0056)

(AD-A073565; HDL-CR-79-056-1) Avail: NTIS HC A09/MF A01 CSCL 19/1

This report describes the development of two silicon

monolithic bipolar integrated circuits and a 10-kHz Tape Automatic Bonded (TAB) hybrid microcircuit oscillator (HMO) for use in the XM587/724 fuze. One of the monolithic integrated circuits was designed to replace the interface hybrid microcircuit. The other monolithic integrated circuit (amplifier) is used in the 10-kHz TAB HMO. The major objective of this effort was to reduce the cost of these two circuits. GRA

N80-13369# Sandia Labs., Albuquerque, N. Mex.
LATCH-UP AND RADIATION INTEGRATED CIRCUIT--LURIC: A TEST CHIP FOR CMOS LATCH-UP INVESTIGATION
D. B. Estreich Nov. 1978 76 p refs
(Contract EX-76-C-04-0789)
(SAND-78-1540) Avail: NTIS HC A05/MF A01

A CMOS integrated circuit test chip latch-up and radiation integrated circuit (LURIC), designed for CMOS latch-up and radiation effects research is described. The purpose of LURIC is (1) to provide information on the physics of CMOS latch-up; (2) to study the layout dependence of CMOS latch-up; and (3) to provide special latch-up test structures for the development and verification of a latch-up model. Test devices and related test structures of the LURIC are also described. DOE

N80-13370# Sandia Labs., Albuquerque, N. Mex.
ROM-BASED SEQUENTIAL CIRCUITS: AN ALTERNATIVE APPROACH TO CONVENTIONAL LOGIC DESIGN
J. L. Schoenaman Dec. 1978 29 p refs
(Contract EY-76-C-04-0789)
(SAND-78-2333) Avail: NTIS HC A03/MF A01

An alternative to the conventional method of designing and implementing clocked sequential circuits is presented. A Read Only Memory was utilized as the main logical element. This approach inherently provides the user with a high degree of flexibility and ease of design. An example design problem which illustrates and clarifies this design procedure is presented. DOE

N80-13371# Georgia Inst. of Tech., Atlanta.
DEVELOPMENT OF AN ELECTRICAL LOAD DEMAND AND RESPONSE MODEL BASED ON A RATIONAL SYNTHESIS FROM ELEMENTARY DEVICES
Jul. 1979 89 p refs
(Contract EM-77-S-01-5109)
(DOE/ET-5109/1) Avail: NTIS HC A05/MF A01

A viable methodology is presented which can be used to synthesize models of power-system load to aid in the following major functions: on-line automatic generation control; short-term bus load forecasting; stochastic power-flow analysis; load management; operational planning; security assessment; and power system stability analysis. The scope of the project is limited to the development of methodology with all associated simulation programs. In order to avoid functioning in a vacuum, a limited amount of information obtainable from utilities and government agencies are utilized in providing a credible data base for the validation methodology and the tuning of model parameters. Although the developed models are primarily useful in the system operation context, the potential planning uses are properly delineated. The methodology develops two types of load models--load demand and load-response. DOE

N80-13372# California Univ., Livermore. Lawrence Livermore Lab.
QUASI-STATIC ELECTRIC FIELD BUILD-UP BETWEEN TWO SPHERICAL CONDUCTORS
K. S. Yee and J. Kasher Jun. 1979 82 p refs
(Contract W-7405-eng-48)
(UCID-18236) Avail: NTIS HC A05/MF A01

Electric fields (or electric potential) and charge density were calculated for spherical dielectric shells with inner and outer conducting surfaces which are traversed by an electron beam through the sphere's center. Poisson equations and partial differential equations were used to solve for the electric fields. DOE

N80-13373# Sandia Labs., Albuquerque, N. Mex. Solid State Devices Physics Div.
IVFOR: A USER ORIENTED PROGRAM CHARACTERIZING THE CURRENT-VOLTAGE PROPERTIES OF A TWO TERMINAL DEVICE
Greg R. Lyons and Jamie J. Wiczer May 1979 24 p
(Contract EY-76-C-04-0789)
(SAND-79-0972) Avail: NTIS HC A02/MF A01

A user-oriented computer program to measure the dc current-voltage characteristics of a two-terminal semiconductor device is described. A complete listing is presented of the necessary computer program steps, an example computer run, and a description of the hardware configuration required to make these measurements. The software reported here is primarily intended for use with BASIC-compatible minicomputers used in automatic or semiautomatic data acquisition systems. DOE

N80-13374# California Univ., Livermore. Lawrence Livermore Lab.
DEVELOPMENT OF ALTERNATE SILICONE POTTING COMPOUNDS. VOLUME 5: DEVELOPMENT OF SUBSTITUTE NO. 1 FOR DOW CORNING'S AEROSPACE SEALANT DC93-122
W. E. Cady and A. T. Buckner 9 Feb. 1979 24 p refs
(Contract W-7405-eng-48)
(UCRL-52434-Vol-5) Avail: NTIS HC A02/MF A01

A substitute for Dow Corning DC93-122 silicone potting resin can be formulated from Sylgard 186, accelerator QCF3-6559, DC1107 fluid, and Cabosil Grade MS-75 SiO2. The substitute is a functional replacement that is fast-setting and nonflowing, but is stronger and harder than the material it replaces. Two lots of Sylgard 186 were evaluated and it was found that the variations in the cure rate of the 186 affect the amounts of accelerator and 1107 required to achieve a fast setup. The variation in the viscosity of the 186 affects the amount of SiO2 required to achieve a non-flow state. Using both accelerator and 1107 to speed up, 186 is preferred both to reduce the porosity of the potting and to achieve a suitable tack-free time. DOE

N80-13375# Sandia Labs., Albuquerque, N. Mex.
EFFECTS OF METALLURGICAL MICROSTRUCTURE OF ARMATURES ON COMPRESSED MAGNETIC FIELD GENERATORS
A. E. Binder and T. V. Nordstrom 1979 27 p refs Presented at the 2d Intern. Conf. on Megagauss Magnetic Field Generation and Related Topics, Washington, D.C., 29 May 1979
(Contract EY-76-C-04-0789)
(SAND-79-0890C; CONF-790540-3) Avail: NTIS HC A03/MF A01

Methods for improving uniform expansion behavior of compressed magnetic field device armatures were studied. Initial microstructure of the copper tubes was altered in a controlled manner by using different forming techniques and alloying. Results show a 25 to 50 percent improvement in uniform explosive expansion radius for electroformed and spun copper armatures compared to standard armatures machined from drawn tubing. Expansion improvement was correlated with changes in the mechanical texture due to forming. The smoother expansion, however, did not result in a significantly higher electrical efficiency with the armature parameters tested. DOE

N80-13376# California Univ., Berkeley. Lawrence Berkeley Lab.
EIGHT-TESLA SYNCHROTON DIPOLES: DESIGN ALTERNATIVES
William S. Gilbert, Glen R. Lambertson, and Robert B. Meuser Mar. 1979 3 p refs Presented at the IEEE Particle Accelerator Conf., San Francisco, 12 Mar. 1979
(Contract W-7405-eng-48)
(LBL-8410; CONF-790327-150) Avail: NTIS HC A02/MF A01

The development of accelerator dipoles with significantly enhanced performance, into the 8 tesla range is described. Analytical design studies, based on idealized configurations, were done to trace the dependence of stresses within the coil and overall magnet size on the magnet aperture, coil current density, central magnetic field, structural ring stress, and magnetic induction in the iron flux-return yoke. The program includes: (1) development and measurements at 4.2 K of coil structures consistent with the requirements of the analytical design studies; (2) superfluid helium 2 at 1.8 K and at atmospheric pressure (large magnets as well as conductors will be tested);

(3) development and evaluation of aluminum stabilization and various superconductors; and (4) tests of various model dipoles with instrumentation to measure mechanical motion. DOE

N80-13377# Lincoln Lab., Mass. Inst. of Tech., Lexington.
CLASSIFICATION AND TECHNICAL REVIEW OF dc-ac INVERTERS FOR USE IN PHOTOVOLTAIC POWER SYSTEMS
E. E. Landsman 30 Apr. 1979 37 p refs
(Contract EY-76-C-02-4094)
(COO-4094-25) Avail: NTIS HC A03/MF A01

A classification system is presented for stand-alone and utility-interactive dc-to-ac inverters used in photovoltaic systems in the 1-to-100-kVA power range. Additional inverter topologies, noted during the classification process, are introduced. To provide background, generally used dc-to-ac inversion technology is reviewed. Relative merits and liabilities of available power devices are discussed and device protective techniques are reviewed. Maximum power point tracking can enhance system value in utility-interactive no-battery photovoltaic power systems. This general theory is reviewed and an improved implementation is described. DOE

N80-13378# Westinghouse Electric Corp., Sharon, Pa. Medium Power Transformer Div.
FEASIBILITY STUDY OF AN ACTIVE SYSTEM FOR TRANSFORMER NOISE ABATEMENT
D. Yannucci May 1979 53 p refs
(Contract EE-77-C-02-4376)
(COO-4376-T1) Avail: NTIS HC A04/MF A01

The feasibility of noise abatement of medium power transformers by means of a novel concept for active sound suppression is presented. Noise abatement was accomplished by destructive interference of sound pressure fluctuations in three narrow frequency bands centered at 120, 240, and 360 Hz. The project included the design and construction of a model transformer; design, fabrication, and testing of two active sound cancellation units; and a cost analysis comparing the active system with conventional transformer sound abatement methods. Its ability to handle low-frequency, high-amplitude signals at about the same cost as high-frequency signals was reported. The potentials of a two-dimensional system under selected conditions were discussed. DOE

N80-13379# California Univ., Livermore. Lawrence Livermore Lab.
TEMPERATURE AND THERMAL STRESS ANALYSIS OF A SWITCHING TUBE ANODE
S. B. Sutton Jan. 1979 32 p refs
(Contract W-7405-eng-48)
(UCID-18049) Avail: NTIS HC A03/MF A01

Details of an analysis performed on a proposed tube anode are presented. The tube configuration is given. The problem was simplified to one dimensional approximations for both the thermal and stress analyses. The underlying assumptions and their implications are discussed. It was concluded that the temperature induced stresses must be minimized in order to maximize the life expectancy of the tube. DOE

N80-13380# Oak Ridge Y-12 Plant, Tenn.
DIGITAL FILTERING TECHNIQUES FOR USE IN MINI-COMPUTERS
C. M. Davenport Aug. 1979 24 p refs
(Contract W-7405-eng-26)
(Y-2184) Avail: NTIS HC A02/MF A01

Two digital filtering techniques are presented which are suitable for small computers (20 to 32K words of main memory). Explicit FORTRAN-coded routines are presented along with example runs. Low-pass and band-pass applications are discussed. DOE

N80-13381# Texas Univ. at Arlington. Energy Systems Research Center.
DETERMINING LOAD CHARACTERISTICS FOR TRANSIENT PERFORMANCES. VOLUME 3: PROCEDURE FOR MODELING POWER SYSTEM LOADS Final Report
M. S. Chen May 1979 101 p refs Sponsored by Elec. Power Res. Inst.
(EPRI-EL-849-Vol-3) Avail: NTIS HC A06/MF A01

The dynamic power response of loads when subjected to excursions of voltage and frequency is investigated. Responses of components (air conditioners, motors, lighting, etc.) to changes in voltage and frequency were measured and component load models were developed from the resulting data. The procedure for modeling power system loads is presented. The modeling philosophy and the prototype procedure for model building is described. Sensitivity analyses of the model building procedure are reported. A user's manual for the computer program developed for use in load modeling is included. DOE

N80-13382# Sandia Labs., Albuquerque, N. Mex.
LATCH-UP CONTROL IN CMOS INTEGRATED CIRCUITS
A. Ochoa, Jr., D. B. Estreich, and W. R. Dawes, Jr. 1979 15 p refs Presented at 1979 IEEE Ann. Conf. on Nucl. and Space Radiation Effects, Santa Cruz, Calif., 17 Jul. 1979
(Contract EY-76-C-04-0789)
(SAND-79-0646C; CONF-790706-1) Avail: NTIS HC A02/MF A01

The potential for latch-up, a pnpn self-sustaining low impedance state, inherent in standard bulk CMOS structures is considered. Latch-up control methods presently employed are surveyed. Their adaptability to VSLI designs is analyzed. DOE

N80-13383# Brookhaven National Lab., Upton, N. Y.
SUPERCONDUCTING PROPERTIES OF (Nb,Ta)3Sn WIRES FABRICATED BY THE BRONZE PROCESS
M. Suenaga, K. Aihara, K. Kaiho, and T. S. Luhman 1979 19 p refs Presented at Cryog. Engr. Conf., Madison, Wis., 21 Aug. 1979
(Contract EY-76-C-02-0016)
(BNL-26391; CONF-790815-9) Avail: NTIS HC A02/MF A01

Measurements of the superconducting critical temperature, critical current density, and the critical magnetic field were made on bronze processed (Nb,Ta)3Sn monofilamentary wires. Ta content in the Nb3Sn compound was varied by alloying the Nb core prior to a reaction heat treatment. Core compositions and heat treatments for the reaction are discussed. The relation of the Ta content with each of the critical measurements during heat treatments is studied. DOE

N80-13384# Bendix Corp., Kansas City, Mo.
PLASMA CLEANING END-OF-PROCESS DETECTION
M. D. Smith 1979 14 p refs Presented at DOE Weapons Complex Ann. Adhesives Conf., Amarillo, Tex., 5 Jun. 1979
(Contract EY-76-C-04-0613)
(BDX-613-2229-Rev; CONF-790668-1) Avail: NTIS HC A02/MF A01

The application of optical emission techniques to detect the removal of trace organic residues was shown to be possible using a vendor's process monitor. Removal of as low as 5 mg total organic contamination was detected in an oxygen plasma. Auger analysis confirmed the cleanliness levels indicated by the end-point detector tested. The simplicity of this type of process monitor lends itself to production line use for the plasma cleaning of various parts and batch sizes. The monitoring of argon plasma cleaning processes using optical emission techniques was investigated. DOE

N80-13385# California Univ., Livermore. Lawrence Livermore Lab.
FAST OPENING SWITCHES CARRYING MULTIMEGAMPERE CURRENTS AND THEIR APPLICATION TO HIGH VELOCITY SHOCK WAVES IN XENON
D. J. Steinberg and J. W. Shearer 20 Feb. 1979 26 p refs Presented at 2d Intern. Conf. on Megagauss Magnetic Field Generation and Related Topics, Washington, D.C., 29 May 1979
(Contract W-7405-eng-48)
(UCRL-82134; CONF-790540-9) Avail: NTIS HC A03/MF A01

High explosive driven, magnetic field generators for use in shock tubes are examined. The development of an aluminum switch which is opened by the pressure produced by the high magnetic field and which will help compress the magnetic flux

faster is reported. The applications and functions of the switch are discussed. A.W.H.

N80-13386# Pisa Univ. (Italy). Ist. di Elettrotecnica.
THE INFLUENCE OF CERAMIC PERMANENT MAGNETS ON THE ARMATURE OF A SMALL POTENTIAL dc MOTOR [SULLA REAZIONE DI ARMATURA NEI MOTORI A CORRENTE CONTINUA DI PICCOLA POTENZA A MAGNETI PERMANENTI CERAMICI]
Adone Bramanti, Giovanni Gallanti, Lucio Taponecco, and Andrea Tellini Dec. 1976 7 p refs In ITALIAN Sponsored by CNR (Rept-1631) Avail: NTIS HC A02/MF A01

The amplitude of the radial and trangential components of the magnetic field due to the armature current are determined, allowing the identification of the permanent magnet areas in which irreversible demagnetization is possible. Some dimensioning criteria for the permanent magnets are also deduced and the increase in the number of rotor slots compatible with technology and economics is suggested. Author (ESA)

N80-13387# Danish Research Center for Applied Electronics, Hoersholm.
CERAMIC CAPACITORS: A COMPARATIVE INVESTIGATION OF THE QUALITY AND STABILITY OF 23 MANUFACTURES AND TYPES, INCLUDING DISC, PLATE AND MULTILAYER CAPACITORS
U. Fabricius and R. B. Jensen Mar. 1979 96 p
(ECR-87) Avail: NTIS HC A05/MF A01

Twenty-three different types of ceramic capacitors distributed by 12 manufacturers were investigated. The types tested include disks, plates, and multilayers representative of both type 1 and type 2 capacitors. Component quality ranges from general purpose to Mil-spec. The purpose of these tests was to obtain a basic understanding and knowledge of ceramic capacitors and to find the stability and relative quality level of the examined capacitors during environmental exposure. A general description of the construction, manufacture, and principle of operation of the capacitors is given and the environmental tests are described. The tests are comparative and all components were exposed to the same severity level, which means that some types were exposed in excess of the manufacturer's specifications. Results are presented in tabular form and by test group. Author (ESA)

N80-13388# National Technical Information Service, Springfield, Va.
COMPUTER AIDED DESIGN OF MICROCIRCUITS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jul. 1979
William E. Reed Sep. 1979 162 p Supersedes NTIS/PS-78/0821; NTIS/PS-77/0711
(NTIS/PS-79/0870/0; NTIS/PS-78/0821; NTIS/PS-77/0711) Avail: NTIS HC $28.00/MF $28.00 CSCL 09E

Government-sponsored research covering the computer aided design, modeling, layout, and packaging of integrated and other microelectronic circuits is presented. Computer programs and the use of computer graphics are included. (This updated bibliography contains 154 abstracts, 15 of which are new entries to the previous edition.) GRA

N80-13389# National Technical Information Service, Springfield, Va.
COMPUTER AIDED DESIGN OF MICROCIRCUITS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jul. 1979
William E. Reed Sep. 1979 253 p Supersedes NTIS/PS-78/0822; NTIS/PS-77/0712
(NTIS/PS-79/0871/8; NTIS/PS-78/0822; NTIS/PS-77/0712) Avail: NTIS HC $28.00/MF $28.00 CSCL 09E

The computer aided design, modeling, layout, and packaging of integrated and other microelectronic circuits is reported. Computer programs and the use of computer graphics are included. This updated bibliography contains 246 abstracts, 40 of which are new entries to the previous edition. GRA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N80-13390 City Univ. of New York, N. Y.
TWO-DIMENSIONAL JET BOUNDARY INTERACTION FOR SUBMERGED THERMAL DISCHARGES Ph.D. Thesis
Joseph Hoch 1979 184 p
Avail: Univ. Microfilms Order No. 7923734

A comprehensive theoretical and experimental study which investigates the jet-boundary interaction of a heated two dimensional jet discharging offset from and parallel to a solid wall is presented. The limiting case of a heated wall jet is also considered. An integral formulation of the conservation equations coupled with appropriate entrainment closure assumptions, provide for the solution of both the velocity and temperature fields, while accounting for the effects of ambient motion. The theoretical model is unique in that the base pressure and radius of curvature in the initial region of the jet are retained as variables. Various comparisons between predicted and measured values of velocity and temperature decay, maximum wall pressure, re-attachment length and recirculation region temperature were made. In general, agreement is good. Dissert. Abstr.

N80-13391 Johns Hopkins Univ., Baltimore, Md.
CENTRIFUGAL INSTABILITY OF DECELERATING SWIRL-FLOW WITHIN FINITE AND INFINITE CIRCULAR CYLINDERS Ph.D. Thesis
George Paul Neitzel, Jr. 1979 224 p
Avail: Univ. Microfilms Order No. 7924632

Centrifugal instability of the flow within a circular cylinder which is spun down is investigated. The cylinder is assumed to be infinitely long so that the flow is governed by simple viscous diffusion alone and the basic state is pure azimuthal flow. Cylinders of finite length are also considered. In this case, the basic state is fully three dimensional, being dominated by the effects of the endwall Ekman layers. The stability of this flow is examined by means of numerical experiments performed for a variety of Reynolds numbers, aspect ratios, and container spin histories. The axisymmetric Navier-Stokes equations are integrated using an existing program. Disturbances due to round-off and truncation errors are found to be sufficient to trigger centrifugal instabilities. Onset times for instabilities, vortex wavelength variation, torque and angular momentum histories, and the applicability of Rayleigh's criterion to this unsteady viscous flow are emphasized. Dissert. Abstr.

N80-13392 Illinois Univ. at Chicago Circle, Chicago.
A THEORY OF VISCOELASTIC ANALOGY FOR WAVE PROPAGATION IN ELASTIC AND VISCOELASTIC LAYERED MEDIA Ph.D. Thesis
Isao Mukunoki 1979 77 p
Avail: Univ. Microfilms Order No. 7925995

Plane wave propagation in the direction normal to the layering of a periodically layered medium is discussed. The layered medium is replaced by an 'equivalent' homogeneous, linear, viscoelastic material whose dynamic response is identical to that of the actual layered medium at the centers of the odd layers. Numerical examples are given for transient waves due to a step load applied at the left boundary. Both a semi-infinite elastic layered medium and a semi-infinite viscoelastic layered medium are considered. The theory is then extended to a finite layered medium. For elastic layered media, a comparison with the exact solution obtained by the ray theory shows that the present theory satisfactorily predicts transient wave responses at any point in the layered medium. This is true regardless of whether the point is near or far from the impact end. Dissert. Abstr.

N80-13393 Oklahoma State Univ., Stillwater.
HEAT-TRANSFER IN HELICALLY COILED TUBES WITH LAMINAR FLOW Ph.D. Thesis
Mohammad A. Abul-Hamayel 1979 194 p
Avail: Univ. Microfilms Order No. 7928188

Research on the heat transfer coefficient for laminar flow inside a helical coil were made. In particular, the possible effect of natural convection, which was found to be very significant at low Reynolds numbers was studied. The axial temperatures show large amplitude oscillations with axial distance, which decay and damp out in the fully developed region. Consequently, the oscillatory behavior was also present in the Nusselt number. The Nusselt number approaches an asymptotic value as the fully developed temperature field is approached. The peripherally-averaged Nusselt number, for the fully developed region, was correlated as a function of Dean, Grashof, Prandtl and Reynolds numbers. The correlation developed includes the contribution of the natural convection effects to the Nusselt number. A better understanding of the heat transfer mechanism in helical coils was obtained. Dissert. Abstr.

N80-13394 Minnesota Univ., Minneapolis.
THE GRADIENT THEORY OF FLUID INTERFACES Ph.D. Thesis
Bruce Stanley Carey 1979 468 p
Avail: Univ. Microfilms Order No. 7926103

The gradient theory of inhomogeneous fluids is extended to complex systems. Experimental planar tensions are used with the gradient theory to determine empirical correlations for the influence parameters of inhomogeneous fluids. The free energy density of homogeneous fluid is computed from the original van der Waals equation or a variation known to be quite accurate for nonpolar fluids. Binary tensions are then combined with the multicomponent gradient theory to determine mixing rules for the interspecies parameters. These parameters and their mixing rules furnish (in conjunction with the equation of state used) all information necessary for multicomponent predictions. The inability of the equation of state to model polar fluids restricts the model's quantitative application to nonpolar fluids. This does not mean, though, that the theory cannot be used at all for liquid-liquid systems. There are nonpolar polymer systems which separate into liquid phases entirely as a result of entropic (size) considerations. Dissert. Abstr.

N80-13395 Minnesota Univ., Minneapolis.
PHASE BEHAVIOR AND INTERFACIAL TENSION STUDIES OF SURFACTANT SYSTEMS Ph.D. Thesis
Elias I. Franses 1979 504 p
Avail: Univ. Microfilms Order No. 7926125

Parallel studies of isomerically pure sodium p (1-heptylnonyl) benzene sulfonate, Texas #1, its mixture with sodium dodecyl sulfate, SDS, and the petroleum sulfonate TRS 10-80 are presented. Phase behavior in water, in decane, and in water-decane mixtures were studied by spectroturbidimetry, polarizing light microscopy, ultracentrifugation, ultrafiltration, densitometry, conductimetry, isopiestic vapor pressure and C-13 and H-1 nuclear magnetic resonance spectroscopy. It is deduced that ultralow tensions arise from the dispersed microcrystallites which form a third, usually liquid crystalline, phase at the decane-brine interfacial region. It appears that neither molecular adsorption from solution nor micelles have anything to do with ultralow tensions, which are sensitive to the third phase microstructure. The implications of these results for the mechanism of ultralow tensions in surfactant flooding processes for enhanced petroleum recovery are discussed. Dissert. Abstr.

N80-13396 Purdue Univ., Lafayette, Ind.
THE EFFECTS OF JOULE HEAT ON TURBULENT DISPERSION OF TEMPERATURE IN HIGH REYNOLDS NUMBER FLOW Ph.D. Thesis
Donald Stuart Kendall 1979 164 p
Avail: Univ. Microfilms Order No. 7926395

The application of a uniform rate-of-strain model to derive the high-wavenumber portion of the temperature fluctuation spectrum is presented. The spectral results obtained, for this particular problem, display an enhancement in the strength of the fine-scale temperature fluctuations over that which would exist with no magnetic field present. This enhancement is the result of the dissipation of magnetic energy into Joule heat and manifests itself in the form of the spectrum function. This form depends strongly on the averaged rates-of-strain of the flow as well as on certain other parameters characteristic of the flow and fluid properties. Dissert. Abstr.

N80-13397 Cornell Univ., Ithaca, N. Y.
NONLINEAR SIMULATION OF TYPE 1 IRREGULARITIES IN THE EQUATORIAL ELECTROJET Ph.D. Thesis
Alice Lynne Newman 1979 220 p
Avail: Univ. Microfilms Order No. 7926940

Through a spectral analysis of many wavenumber modes after the saturation of the instability, the models discussed reproduce characteristic features of type 1 spectral irregularities observed by radar and resolve a number of theoretical questions. In particular, it was shown that (1) the phase velocity of dominant wavenumber modes tends to the acoustic velocity rather than to the electron drift velocity when quasilinear velocity reduction is allowed, and (2) the instability can establish a saturated state in less than a second. Assuming that the electrojet is turbulent on a scale of tens of meters or more, the isotropy of radar observations with respect to radar elevation angle is not inconsistent with our simulated results. Dissert. Abstr.

N80-13398 Florida State Univ., Gainesville.
A LARGE STRUCTURE MODEL OF TURBULENCE IN TWO-DIMENSIONAL JETS Ph.D. Thesis
Kuo-chang Chen 1979 81 p
Avail: Univ. Microfilms Order No. 7926730

A statistical model of the large structures of the turbulence in a fully developed two dimensional jet is presented. Second order turbulence statistics including single point Reynolds stress distribution, root mean square turbulent velocity component fluctuation distributions, root mean square turbulent pressure fluctuation distribution, power spectra, and two point correlation functions are predicted by the model. Numerical results of Reynolds stress and root mean square velocity component fluctuations compare favorably with experimental data. This lends strong support to the belief that the second order turbulence statistics of this flow are dominated by the contributions of the large structures. Dissert. Abstr.

N80-13399 Virginia Univ., Charlottesville.
MATHEMATICAL MODELING OF THE BREAKUP OF LAMINAR CAPILLARY JETS Ph.D. Thesis
Gerald Anthony Aiello 1978 116 p
Avail: Univ. Microfilms Order No. 7928057

A model describing the laminar breakup of a jet of Newtonian fluid issuing from a cylindrical tube is developed. It is shown how tube geometry can influence the breakup dynamics through the effect of the developing laminar velocity field, and through the generation of specific perturbations characteristic of the tube geometry. It is shown that the average drop size from a horizontal jet is influenced both by the laminar velocity field and the perturbations, while the average drop size from a vertical jet is determined primarily by the jet radius near the jet breakup point. The calculated results are compared with published experimental results. Dissert. Abstr.

N80-13400 Southern Methodist Univ., Dallas, Tex.
INVESTIGATION OF BLOWN BOUNDARY LAYERS WITH AN IMPROVED WALL JET STREAM Ph.D. Thesis
Kondala Rao Saripalli 1979 320 p
Avail: Univ. Microfilms Order No. 7927006

Measurements were made in a two dimensional incompressible wall jet submerged under a thick upstream boundary layer, with a zero pressure gradient and an adverse pressure gradient. The measurements included mean velocity and Reynolds stresses profiles, skin friction, and turbulence spectra. The measurements were confined to practical ratios (less than 2) of the jet velocity to the free stream velocity. The wall jet used in the experiments has an asymmetric velocity profile with a relatively higher concentration of momentum away from the wall. It was shown that an asymmetric jet velocity profile has distinct advantages over a uniform jet velocity profile, especially in the control of separation. Predictions were made using the method for blown boundary layers. The predictions clearly show the difference in flow development between an asymmetric jet velocity profile and a uniform jet velocity profile. Dissert. Abstr.

N80-13401*# Rice Univ., Houston, Tex.
EVAPORATIVE COOLING ON A GROOVED SURFACE M.S. Thesis
Dwight Yoder 5 May 1979 42 p refs

(Contract NAS9-65274)
(NASA-CR-160410) Avail: NTIS HC A03/MF A01 CSCL 20D

The transition point where water begins to accumulate on the surface during spray evaporative cooling was investigated experimentally to determine the temperatures and corresponding heat flux at which this transition occurs. Several pressure ranges were considered including one below the triple point of water. Additionally, the results using a grooved surface were compared to those using a smooth surface. It was determined that a grooved surface has no effect on the heat transfer. K.L.

N80-13402*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AEROTHERMAL PERFORMANCE OF RADIATIVELY AND ACTIVELY COOLED PANEL AT MACH 6.6
Charles P. Shore and Irving Weinstein Dec. 1979 42 p refs
(NASA-TP-1595; L-13355) Avail: NTIS HC A03/MF A01 CSCL 20D

A flight-weight radiative and actively cooled honeycomb sandwich panel (RACP) was subjected to multiple cycles of both radiant and aerothermal heating. The 0.61 m by 1.22 m test specimen incorporated essential features of a full scale 0.61 m by 6.10 m RACP designed to withstand a heat flux of 136 kW/sq m. The panel consisted of heat shields, a thin layer of high temperature insulation, and an aluminum honeycomb sandwich panel with coolant tubes next to the sandwich skin. A 60/40 mass solution of ethylene glycol/water was used to cool the panel which successfully withstood a total of 3.5 hr of radiant heating and 137 sec exposure to an M = 6.6 test stream. Heat shield temperatures reached 1080 K (1945 deg R), and cooled-panel temperatures reached 382 K (687 deg R) midway between coolant tubes. Simulation of the full scale panel indicated that the full scale RACP would perform as expected. The tests revealed no evidence of coolant leakage or hot gas ingress which would seriously degrade the RACP performance.
Author

N80-13403*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MARANGONI BUBBLE MOTION IN ZERO GRAVITY
Robert L. Thompson and Kenneth J. DeWitt (Toledo Univ.) 1979 38 p refs Presented at the 72nd Ann. Meeting of the AICE, San Francisco, 25-29 Nov. 1979
(NASA-TM-79250; E-160) Avail: NTIS HC A03/MF A01 CSCL 20D

It was shown experimentally that the Marangoni phenomenon is a primary mechanism for the movement of a gas bubble in a nonisothermal liquid in a low gravity environment. A mathematical model consisting of the Navier-Stokes and thermal energy equations, together with the appropriate boundary conditions for both media, is presented. Parameter perturbation theory is used to solve this boundary value problem; the expansion parameter is the Marangoni number. The zeroth, first, and second order approximations for the velocity, temperature and pressure distributions in the liquid and in the bubble, and the deformation and terminal velocity of the bubble are determined. Experimental zero gravity data for a nitrogen bubble in ethylene glycol, ethanol, and silicone oil subjected to a linear temperature gradient were obtained using the NASA Lewis zero gravity drop tower. Comparison of the zeroth order analytical results for the bubble terminal velocity showed good agreement with the experimental measurements. The first and second order solutions for the bubble deformation and bubble terminal velocity are valid for liquids having Prandtl numbers on the order of one, but there is a lack of appropriate data to test the theory fully. K.L.

N80-13404*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMBUSTION OF SOLID CARBON RODS IN ZERO AND NORMAL GRAVITY
C. M. Spuckler, F. J. Kohl, R. A. Miller, C. A. Stearns, and K. J. DeWitt (Toledo Univ.) 1979 32 p refs Presented at the 72nd Ann. AICE Meeting, San Francisco, 25-29 Nov. 1979
(NASA-TM-79303; E-255) Avail: NTIS HC A03/MF A01 CSCL 21B

In order to investigate the mechanism of carbon combustion, spectroscopic carbon rods were resistance ignited and burned in an oxygen environment in normal and zero gravity. Direct mass spectrometric sampling was used in the normal gravity tests to obtain concentration profiles of CO2, CO, and O2 as a function of distance from the carbon surface. The experimental concentrations were compared to those predicted by a stagnant film model. Zero gravity droptower tests were conducted in order to assess the effect of convection on the normal gravity combustion process. The ratio of flame diameter to rod diameter as a function of time for oxygen pressures of 5, 10, 15, and 20 psia was obtained for three different diameter rods. It was found that this ratio was inversely proportional to both the oxygen pressure and the rod diameter. K.L.

N80-13405*# Rice Univ., Houston, Tex.
A FUNDAMENTAL STUDY OF LIQUID SPRAY EVAPORATION AT A HEATED SURFACE Final Report
F. A. Wierum 25 Oct. 1979 7 p
(Contract NAS9-15274)
(NASA-CR-160409) Avail: NTIS HC A02/MF A01 CSCL 20D

The influence of feedwater temperature and the influence of pulsing nozzle flow on the heat transfer characteristics in the spray evaporative cooling process were investigated. A commercial water circulation heater was installed in the feedwater line between the supply reservoir and the nozzle. A pass through the heater provided water at temperatures up to 50 C at the nozzle; higher temperatures were obtained by multiple heater passes. A thermocouple installed in the water line just upstream of the nozzle provided a measure of the feedwater temperature. Initial tests were run with belljar exhaust orifice number two which provided a pressure in a range about 7mm Hg abs. The feedwater temperature was heated to a temperature of 45 C. Results indicate that for a given system operating pressure, there is an upper limit on the feedwater temperature above which the spray will flash to vapor before hitting the surface to be cooled. R.C.T.

N80-13406# Aerospace Corp., El Segundo, Calif. Aerothermodynamics Dept.
A NUMERICAL SOLUTION FOR TEMPERATURE DISTRIBUTIONS IN A DISCRETE INJECTION TRANSPIRATION-COOLED NOSETIP SYSTEM Final Report, Jun. - Sep. 1978
A. R. Karagozian 20 Aug. 1979 62 p refs
(Contract F04701-78-C-0079)
(AD-A073340; TR-0079(4550-73)-1; SAMSO-TR-79-52) Avail: NTIS HC A04/MF A01 CSCL 16/3

An analysis is performed to describe the thermodynamics behavior of 'fin' and fluid components of a transpiration-cooled nosetip system. Partial differential equations governing fin and fluid temperatures are derived and solved numerically to yield time-dependent distributions. Correlations used for the subcooled boiling heat transfer mechanism are found to over-predict the amount of heat removed from the fin in depth. A comparison of temperature distributions indicates that the fluid equation may be considered as steady state with a negligible effect on the solution. The numerical scheme used to solve the governing equations is strongly stable, even when drastic changes in parameters occur. GRA

N80-13407# Oak Ridge National Lab., Tenn.
INCAP: A FINITE ELEMENT PROGRAM FOR ONE-DIMENSIONAL NONLINEAR INVERSE HEAT CONDUCTION ANALYSIS
B. R. Bass Jul. 1979 93 p refs
(Contract W-7405-eng-26)
(ORNL/NUREG/CSD/TM-8; NUREG-CR-0832) Avail: NTIS HC A05/MF A01

The calculation of the surface temperature and surface heat flux from a measured temperature history at an interior point of a body, identified in literature as the inverse heat conduction problem, is examined. An inverse solution technique that utilizes a finite element heat conduction model and a nonlinear estimation procedure is presented. The technique is applicable to the one dimensional nonlinear model with temperature dependent thermophysical properties. A digital computer program INCAP (inverse heat conduction analysis program) is developed from the formulation and is used in a comparative study with the

finite difference inverse code ORINC (ORNL inverse code). Two representative thermocouple transients obtained from electrically heated composite rods during a simulated loss of coolant accident are analyzed with INCAP and ORINC and the results are compared. DOE

N80-13408# Idaho National Engineering Lab., Idaho Falls.
HORIZONTAL TWO-PHASE FLOW TRANSIT TIME MEASUREMENTS
A. G. Baker 1979 27 p refs Presented at Reactor Safety Instrumentation Rev. Group, Silver Spring, Md., 24 Jul. 1979
(Contract EY-76-C-07-1570)
(CONF-790745-2) Avail: NTIS HC A03/MF A01

A transit time flowmeter (TTF) indirectly determines fluid velocity by measuring the time of transit of the fluid between two sensors of known separation. The transit time is obtained by cross-correlation, and the velocity by dividing the intersensor separation distance by the transit time. Various sensors were tested for suitability. Performance was determined by comparison of the TTF velocity to that computed from or indicated by the instrumentation of the test facilities. Conductivity probes, single-beam gamma densitometers, and pitot tubes were tested in steady state air-water conditions. The densitometers performed best, followed by the conductivity probes and the pitot tubes. Stratification effects were detected in this horizontal flow application which confuse a straightforward interpretation of the TTF velocity. DOE

N80-13409# Idaho National Engineering Lab., Idaho Falls.
DRAG DEVICES FOR TWO-PHASE MASS FLOW MEASUREMENTS
J. L. Anderson (Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho) 1979 63 p refs Presented at Colloq. on Two-Phase Instrumentation, Idaho Falls, Idaho, 11 Jun. 1979
(Contract EY-76-C-04-1570)
(CONF-790655-5) Avail: NTIS HC A04/MF A01

Full flow drag devices were tested in steady state air-water mixtures and transient steam-water mixtures in order to obtain two-phase mass flow measurements. Modeling methods for obtaining mass flow rates are discussed along with the effects of two-phase flows on the drag coefficient of full flow multihole drag plates. DOE

N80-13410# California Univ., Livermore. Lawrence Livermore Lab.
SHOCK COMPRESSION OF LIQUID METHANE AND THE PRINCIPLE OF CORRESPONDING STATES
W. J. Nellis, A. C. Mitchell, M. Ross, and M. vanThiel 24 Jul. 1979 7 p refs Presented at the 7th Intern. AIRAPT Conf., La Creusot, France, 30 Jul. - 3 Aug. 1979
(Contract W-7405-eng-48)
(UCRL-82127; CONF-790709-8) Avail: NTIS HC A02/MF A01

The principal Hugoniot of liquid methane was measured between 5 to 43 GPa and a doubly shocked state was measured at 91 GPa. The repulsive pair potential for methane and argon were demonstrated to obey the principle of corresponding states. DOE

N80-13411# California Univ., Livermore. Lawrence Livermore Lab.
EFFECTS OF CELLULAR STRUCTURE ON THE BEHAVIOR OF GASEOUS DETONATION WAVES UNDER TRANSIENT CONDITIONS
P. A. Urtiew and C. M. Tarver 16 Jul. 1979 39 p refs Presented at the 7th Intern. Colloq. on Gas Dyn. of Explosions and Reactive Systems, Gottingen, West Germany, 20-24 Aug. 1979
(Contract W-7405-eng-48)
(UCRL-82270; CONF-790828-2) Avail: NTIS HC A03/MF A01

Assuming that the cellular structure of the detonation wave is responsible for its existence and its uniqueness, the effect of variation in the cross-sectional area of the tubes on the cell size and on the survival of the detonative process during the transition was investigated. A comparison of the results show that it is not the tube diameter nor the initial pressure of the medium that controls the survival of the wave, but that it is (1) the number of cells available to endure losses from flow effects generated by the transient conditions and (2) the number of cells remaining to regenerate new cells to revive the detonation process. DOE

N80-13412# Oak Ridge National Lab., Tenn. Engineering Tech. Div.
CONDENSATION AND EVAPORATION HEAT TRANSFER WITH LOW-BOILING TEMPERATURE FLUIDS
R. W. Murphy and H. W. Hoffman 1979 4 p Presented at Southeastern Seminar on Thermal Sci., SESTS, Boca Raton, Fla., 10 May 1979
(Contract W-7405-eng-26)
(CONF-790539-1) Avail: NTIS HC A02/MF A01

Heat transfer research related to OTEC and geothermal energy conversion power cycles is reviewed. DOE

N80-13413# Oak Ridge National Lab., Tenn.
TWO-PHASE FLOW MEASUREMENTS WITH ADVANCED INSTRUMENTED SPOOL PIECES AND LOCAL CONDUCTIVITY PROBES
K. G. Turnage and C. E. Davis 1979 33 p refs Presented at Reactor Safety Instrumentation Review Group Meeting, Silver Spring, Md., 25 Jul. 1979
(Contracts W-7405-eng-26; DOE-IA-40-551-75; DOE-IA-40-552-75)
(CONF-790745-1) Avail: NTIS HC A02/MF A01

A series of two phase, air water and steam water tests performed with instrumented spool pieces and with conductivity probes is described. The behavior of the three beam densitometer, turbine meter, and drag flowmeter is discussed in terms of two phase models. Application of some two phase mass flow models to the recorded spool piece data is made and preliminary results are shown. Velocity and void fraction information derived from the conductivity probes is presented and compared to velocities and void fractions obtained using the spool piece instrumentation. DOE

N80-13414# West Virginia Univ., Morgantown. Dept. of Aerospace Engineering.
FLUIDIZED BED FLOW EQUATIONS
Nathan Ness and Jerome B. Fanucci Jul. 1978 253 p refs
(Contract EY-77-C-21-8087)
(METC/CR-78/10) Avail: NTIS HC A12/MF A01

The detailed derivation of the conservation equation of mass, momentum, and energy for a fluidized bed are presented. The development of the chemical production term is included. The equations contain momentum exchange terms, viscosity and thermal conductivity transport coefficients for the fluid and solid, and other flow quantities which require constitutive relations before a solution is attempted. An iterative procedure, involving fluidized bed test data and the solution of these flow equations, could be employed to model these constitutive relations. The equations are then specialized to the one dimensional, steady flow for a high temperature two phase chemically reacting multispecies fluid and a single species solid. Solutions to this system are discussed. DOE

N80-13415# General Atomic Co., San Diego, Calif.
MINT COMPUTER PROGRAM FOR NUMERICAL COMPUTATION OF TURBULENT FLOW: AN OVERVIEW
T. E. Burton May 1979 44 p refs
(Contracts DE-AT03-76ET-35300; EY-76-C-03-0167)
(GA-A-15148) Avail: NTIS HC A03/MF A01

The MINT finite difference code is described. The code solves the full Navier-Stokes momentum transport equations, the mass and energy transport equations, and two additional transport equations which model turbulence. MINT efficiently handles turbulent wall layers and implements most standard boundary conditions with a minimum of user effort. Flow geometries must be simple and each boundary surface must coincide with a grid point surface. No reentrant corners are permitted. DOE

N80-13416# Idaho National Engineering Lab., Idaho Falls.
PITOT TUBE AND DRAG BODY MEASUREMENTS IN TRANSIENT STEAM-WATER FLOWS
J. R. Fincke, V. A. Deason, and M. W. Dacus 1979 11 p refs Presented at 25th ISA Intern. Instrumentation Symp.,

Anaheim, Calif., 7 May 1979
(Contract EY-76-C-07-1570)
(CONF-790505-15) Avail: NTIS HC A02/MF A01

The use of full flow drag devices and rakes of water cooled Pitot tubes to measure the transient two phase mass flow during loss of coolant experiments in pressurized water reactor (PWR) environments is discussed. Mass flow rate measurements were obtained in high temperature and pressure environments, similar to PWRs, under transient conditions. Comparisons of the measured time integrated value of mass flow to the known system mass before depressurization are presented. DOE

N80-13417# Brookhaven National Lab., Upton, N. Y.
EXPERIMENTAL INVESTIGATIONS OF NONEQUILIBRIUM FLASHING OF WATER IN A CONVERGING-DIVERGING NOZZLE
G. A. Zimmer, B. J. C. Wu, W. J. Leonhardt, N. Abuaf, and O. C. Jones, Jr. Feb. 1979 36 p refs Presented at the 18th ASME Natl. Heat Transfer Conf., San Diego, Calif., Aug. 1979
(Contract EY-76-C-02-0016)
(BNL-NUREG-25716; CONF-790808-6) Avail: NTIS HC A03/MF A01

A steady water loop with well controlled flow and thermodynamic conditions was designed, built, and made operational to measure the net vapor generation rates under nonequilibrium conditions. The test section consists of a converging-diverging nozzle with 49 pressure taps and observation windows at the exit. First pressure distributions and photographic observations were recorded under various flashing conditions. The effect of the various parameters such as inlet pressure, inlet temperature, mass flux, and back pressure on the pressure distributions and flashing regimes were investigated. Under specific flashing conditions, a sharp increase in pressure (condensation shock) was observed in the diverging section (which accommodates the high back pressures). The experiments are being continued with a gamma densitometer to measure the void fraction distributions needed in the vapor generation rate calculations. DOE

N80-13418# Brookhaven National Lab., Upton, N. Y.
BASIC RESEARCH NEEDS IN FLUID MECHANICS
O. C. Jones, Jr. Mar. 1979 43 p refs
(Contract EY-76-C-02-0016)
(BNL-50995) Avail: NTIS HC A03/MF A01

The long-range needs for basic research in fluid mechanics are examined. The topics identified included: turbulence; multiphase flows; fluid structure interactions; boundary layer effects; biological, geological, and environmental fluid flow; and the need for new facilities and improved instrumentation. These areas are reviewed. DOE

N80-13419# Sandia Labs., Albuquerque, N. Mex. Numerical Mathematics Div.
HEAT CONDUCTION FROM A SPHERE TO AN INFINITE EXTERNAL REGION
Donald E. Amos Jul. 1979 21 p refs
(Contract EY-76-C-04-0789)
(SAND-79-0366) Avail: NTIS HC A02/MF A01

The cooling of a sphere by heat conduction to an infinite external region is considered. Both regions are considered to have constant physical parameters with the internal sphere initially at temperature V and the external region initially at temperature zero. Conduction takes place across the boundary so that temperature and heat flux are continuous. Three separate cases involving differences in the thermal diffusivities k sub 1, k sub 2, and conductivities K sub 1, K sub 2 are considered: (1) k sub 1 = k sub 2 and K sub 1 = K sub 2; (2) k sub 1 not equal to k sub 2 and K sub 1 not equal to K sub 2; and (3) K sub 1 = infinity. In this latter case, the inner sphere has heat capacity, but zero thermal gradient. In each case, the temperature distributions are obtained as well as the short and long time asymptotic behavior. DOE

N80-13420# Technische Univ., Berlin (West Germany). Inst. fuer Chemieingenieurtechnik.
DEVELOPMENT OF A MASS TRANSFER MACHINE FOR GAS/LIQUID OPERATIONS IN THE ABSENCE OF GRAVITY Final Report
Heinz Brauer and Wilhelm Gaebelein Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1978 80 p refs In GERMAN; ENGLISH summary
(Contracts BMFT-SLN-7761; DFVLR-BPT-01-QV-236)
(BMFT-FB-W-78-20) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16,80

The mass transfer machine that was developed for countercurrent gas/liquid operations is distinguished by an extremely high mass transfer efficiency per unit volume and by a very small overall volume. The design of the mass transfer machine, the experimental setup, the measuring equipment, and some of the results obtained are discussed. In order to understand the fluid dynamics of the two-phase system, the movement of gas and liquid is discussed separately. Comprehensive descriptions of the movement of the liquid film on the rotating surfaces, the disintegration of the liquid film in each stage as well as of the movement of the generated drops are given. The measured pressure drop in the gas and its correlation to the liquid flow are reported. Author (ESA)

N80-13421# Technische Universitaet, Hanover (West Germany). Inst. fuer Stroemungsmaschinen.
CONTRIBUTIONS TO MARANGONI CONVECTION IN CYLINDRIC MELTING ZONES: EXPERIMENTAL SIMULATION AND CALCULATION OF THE INFLUENCE OF GRAVITY Final Report
Chung-Hwan Chun Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1978 37 p refs In GERMAN; ENGLISH summary
(Contracts BMFT-SLN-7761; DFVLR-BPT-01-QV-576)
(BMFT-FB-W-78-39) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlruhe, West Germany DM 7,60

The possibilities and limitations of the experimental simulation of microgravity effects relative to Marangoni convection are discussed. The experiments are useful in verifying theoretical results for the prediction of flow phenomena in Spacelab experiments with microgravity. The influence of gravity on Marangoni convection during silicon melting is also theoretically investigated, calculating the flow in a floating zone for crystal growth for experiments on earth. Results show that Marangoni convection predominates over thermal gravity convection even for conditions on Earth. Author (ESA)

N80-13422# National Engineering Lab., East Kilbride (Scotland). Applied Heat Transfer Div.
CONDENSOR OPERATED INVERSE THERMOSIPHONS
D. Chisholm, I. D. R. Grant, and P. J. D. Duncan Sep. 1978 23 p refs
(NEL-659) Avail: NTIS HC A02/MF A01

A form of inverse thermosiphon is described and procedures for its use in thermal hydraulic design are outlined. The use of these procedures in the design of devices containing water as the working fluid is emphasized and charts for use in estimating performance developed. The use of an evaporator with a capillary surface is then examined and equations for the lift ratio as a function of circulation rate are derived both for a condenser with and without a capillary surface. Equations relating lift ratio to dryness fraction for use with systems using water are shown. It is noted that the temperature difference between the vapor in the principal and ancillary condensers can be a major factor governing design of these devices. Suitable fluids for use in the temperature range zero to 200C are then discussed.
Author (ESA)

N80-13423# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France).
A REVIEW OF RESEARCH INTO OSCILLATING BOUNDARY LAYERS [APERCU DES RECHERCHES SUR LES COUCHES LIMITES EN ENCOULEMENT PULSE]
Jean Cousteix Paris Assoc. Aeron. et Astronautique de France 1979 25 p refs In FRENCH; ENGLISH summary Presented at 15th Colloq. d'Aerodyn. Appl., Marseille, 7-9 Nov. 1978
(AAAF-NT-79-04; ISBN-2-7170-0531-5) Avail: NTIS HC A02/MF A01; CEDOCAR, Paris FF 17 (France and EEC) FF 21 (others)

The state of the art in the field of unsteady boundary layer research is reviewed. The subjects discussed for laminar flow include oscillation with nul average flow, secondary flow induced by the oscillating motion (steady steaming), oscillation with a nonzero average flow, and the influence of phase velocity. For

turbulent flow, the subjects discussed include oscillation with a nul average, oscillation with a nonzero constant average, the influence of wave convection velocity, the influence of unfavorable average pressure gradients, and the separation problem and the singularities in boundary layer calculations. Author (ESA)

N80-13424# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France).
FIRST RESULTS OF A STUDY ON TURBULENT BOUNDARY LAYERS IN AN OSCILLATING FLOW WITH A MEAN ADVERSE PRESSURE GRADIENT [PREMIERS RESULTATS D'UNE ETUDE SUR LES COUCHES LIMITES TURBULENTES EN ENCOULEMENT PULSE AVEC GRADIENT DE PRESSION MOYEN DEFAVORABLE]
Robert Houdeville and Jean Cousteix Paris Assoc. Aeron. et Astronautique de France 1979 19 p refs In FRENCH; ENGLISH summary Presented at 15th Colloq. d'Aerodyn. Appl., Marseille, 7-9 Nov. 1978
(AAAF-NT-79-05; ISBN-2-7170-0532-3) Avail: NTIS HC A02/MF A01; CEDOCAR, Paris FF 17 (France and EEC) FF 21 (others)

The development of unsteady turbulent boundary layer subjected to an average pressure gradient large enough to produce separation was studied in order to complete the results already obtained with flat plates. Hot wire anemometers and a laser velocimeter equipped with Bragg cells were used. It is shown that the boundary layer, as in the case of a flat plate, responds to the external excitation with forced pulsations and that the average position of the zero friction point oscillates at the same frequency as the applied external excitation. The average velocity profiles obtained at various times of the period compare well with profiles deduced from similitude solutions. Author (ESA)

N80-13425# National Technical Information Service, Springfield, Va.
NUMERICAL METHODS IN FLUID FLOW PROBLEMS, VOLUME 4. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Sep. 1977 - Jul. 1978
Guy E. Habercom, Jr. Aug. 1979 130 p
(NTIS/PS-79/0851/0) Avail: NTIS HC $28.00/MF $28.00 CSCL 20D

Among the numerical techniques cited are finite difference theory, finite element analysis, and numerical integration of differential equations including the Navier Stokes equations. Areas studied include boundary layer, hypersonic, supersonic, transonic regimes, atmosphere entry, heat transfer, blunt and concave bodies, gas dynamics, nozzle gas flow, turbomachinery, and hydrodynamics. This updated bibliography contains 121 abstracts, none of which are new entries to the previous edition. GRA

N80-13426# National Technical Information Service, Springfield, Va.
NUMERICAL METHODS IN FLUID FLOW PROBLEMS, VOLUME 5. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Aug. 1978 - Jul. 1979
Guy E. Habercom, Jr. Aug. 1979 167 p Supersedes NTIS/PS-78/0824; NTIS/PS-77/0798; NTIS/PS-76/0740; NTIS/PS-75/643; and COM-74-11499
(NTIS/PS-79/0852/8; NTIS/PS-78/0824; NTIS/PS-77/0798; NTIS/PS-76/0740; NTIS/PS-75/643; COM-74-11499) Avail: NTIS HC $28.00/MF $28.00 CSCL 20D

Among the numerical techniques cited in this report for analysis of fluid flow problems include finite difference theory, finite element analysis, and numerical integration of differential equations including the Navier Stokes equations. Areas studied include boundary layer, hypersonic, supersonic, transonic regimes, atmosphere entry, heat transfer, blunt and concave bodies, gas dynamics, nozzle gas flow, turbomachinery, and hydrodynamics. This updated bibliography contains 158 abstracts, all of which are new entries to the previous edition. GRA

N80-13073# Academy of Sciences (USSR), Moscow.
CONVECTIVE PROCESSES AT LOW GRAVITY
V. I. Polezhaev *In* ESA Mater. Sci. in Space Jun. 1979 p 25-31 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13078# Polytechnical Univ. of Madrid (Spain).
FLOATING ZONE STABILITY (EXP. 1-ES-331)
I. DaRiva and I. Martinez *In* ESA Mater. Sci. in Space Jun. 1979 p 67-73 refs Sponsored by Spanish Natl. Comm. for Space Res. (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13087# Fiat Research Center, Turin, Italy.
THE FLUID PHYSICS MODULE: A CONTRIBUTION TO MATERIALS SCIENCE AND PHYSICS IN SPACE
G. Ceronetti and G. Rovera *In* ESA Mater. Sci. in Space Jun. 1979 p 137-147 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13103# Bristol Univ. (England). School of Chemistry.
FUNDAMENTAL AND APPLIED ASPECTS OF FLUID PHYSICS UNDER MICROGRAVITY
J. M. Haynes *In* ESA Mater. Sci. in Space Jun. 1979 p 275-279 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13104# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
FLOW PHENOMENA IN ROTATING FLOATING ZONES WITH AND WITHOUT MARANGONI CONVECTION
Ch.-H. Chun and W. Wuest *In* ESA Mater. Sci. in Space Jun. 1979 p 283-288 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13110# Little (Arthur D.), Inc., Cambridge, Mass.
EXPERIMENTS ON THE STABILITY OF CONICAL AND CYLINDRICAL LIQUID COLUMNS AT LOW BOND NUMBERS
A. A. Fowle, C. A. Wang, and P. F. Strong *In* ESA Mater. Sci. in Space Jun. 1979 p 317-325 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13111# Justus Liebig-Universitaet, Giessen (West Germany). Inst. fuer Physikalisches.
STEADY AND OSCILLATORY MARANGONI CONVECTION IN FLOATING ZONES UNDER 1g
D. Schwabe, A. Scharmann, and F. Preisser *In* ESA Mater. Sci. in Space Jun. 1979 p 327-333 refs Sponsored by DFVLR (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13113# Essen Univ. (West Germany).
MIGRATION OF GAS BUBBLES UNDER VARIOUS FORCE FIELDS IN A MICROGRAVITATIONAL ENVIRONMENT
J. Siekmann *In* ESA Mater. Sci. in Space Jun. 1979 p 341-347 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13114# Naples Univ. (Italy).
MARANGONI BOUNDARY LAYERS
L. G. Napolitano *In* ESA Mater. Sci. in Space Jun. 1979 p 349-358 refs (For primary document see N80-13069 04-12) (Contract CNR/SAS-77-061)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13115# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.
MARANGONI CONVECTION IN A LIQUID LAYER SUBJECTED TO ROTATION ABOUT A TRANSVERSE AXIS
G. S. R. Sarma *In* ESA Mater. Sci. in Space Jun. 1979 p 359-362 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N80-13427*# Santa Clara Univ., Calif.
THE DEVELOPMENT OF A DRAG SENSING THREE DIMENSIONAL TURBULENT BALL PROBE
Dah Yu Cheng Dec. 1977 77 p refs
(Grant NGR-05-017-033)
(NASA-CR-152269) Avail: Issuing Activity CSCL 14B

A three dimensional turbulent fluctuating probe was developed which utilizes the drag properties of a sphere to measure real time fluctuations of velocities and density along three orthogonal axes. Real time Reynolds stress waves were measured directly. The working principle is discussed in depth, including the fluid mechanical consideration and nonideal dynamic systems of electromagnetic sensing properties. The probe and the electronic system were fabricated and tested as a three channel signal processor. The probe was calibrated and extensively tested with various tripping means at the leading edge of a flat plate with and without a cavity. Results are presented in terms of compliances, dynamic response, calibration, Reynolds stress waves, and spectra of different test models. K.L.

N80-13428 Northwestern Univ., Evanston, Ill.
A NEW THERMAL CONDUCTIVITY APPARATUS FOR SMALL CONDUCTING SPECIMENS AND MEASUREMEMTS ON NIOBIUM MONOXIDE Ph.D. Thesis
Ning Hsieh 1979 212 p
Avail: Univ. Microfilms Order No. 7927373

An apparatus for measuring the thermal conductivity and other transport properties of small conducting specimens was designed and constructed using the Kohlrausch-Callendar type method, where the heat source is the Joule heating of the specimen itself caused by passing an electric current through. The apparatus was used to measure the thermal conductivity, electrical resistivity, and the thermoelectric power of two NbO specimens in the temperature range of 100 to 650K. The Lorenz ratio showed a positive deviation from the Sommerfeld value for simple metals that was attributed to the energy band structure effect. The impact of the band structure effect in interpreting the temperature dependence of electrical resistivity was discussed. The results suggest that reservations should be made when the theory of normal metals is applied to conducting oxides and other compounds, because many of the nonmetal conductors are known to have complex energy band structures.
Dissert. Abstr.

N80-13429*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A LOW ENERGY ELECTRON MAGNETOMETER
Jag J. Singh, George M. Wood, Jr., Grayson H. Rayborn (Univ. of Southern Missippi, Hattiesburg), and Frederick A. White (Rensselaer Polytechnic Inst., Troy, N. Y.) Washington Dec. 1979 24 p refs
(NASA-TM-80172; L-13329) Avail: NTIS HC A02/MF A01 CSCL 14B

The concept of a highly sensitive magnetometer based on the deflection of low energy electron beams in magnetic fields is analyzed. Because of its extremely low mass and consequently high e/m ratio, a low energy electron is easily deflected in a magnetic field, thus providing a basis for very low field measurement. Calculations for a specific instrument design indicate that a low energy electron magnetometer (LEEM) can measure magnetic fields as low as 1000 nT. The anticipated performance of LEEM is compared with that of the existing high resolution magnetometers in selected applications. The fast response time of LEEM makes it especially attractive as a potential instrument for magnetic signature analysis in large engineering systems.
J.M.S.

N80-13430*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INSTRUMENT ERROR ANALYSIS AS IT APPLIES TO WIND-TUNNEL TESTING
Emanuel Rind Dec. 1979 61 p
(NASA-TP-1572; L-13222) Avail: NTIS HC A04/MF A01 CSCL 14B

Errors resulting from the instrumentation used to measure wind tunnel model parameters are analyzed. The pertinent parameters, their standard deviations, and the theoretical derivation of them, are given. Some BASIC programs and plots for the standard deviations of dynamic pressure, Mach number, and Reynolds number are included. K.L.

N80-13431# Sandia Labs., Albuquerque, N. Mex.
DEVELOPMENT OF IN SITU MARINE SEISMIC AND GEOTECHNICAL INSTRUMENTATION SYSTEMS
E. W. Reece 1979 18 p refs Presented at DOE Symp. on Enhanced Oil and Gas Recovery and Improved Drillings Technol., Tulsa, Okla., 22 Aug. 1979
(Contract EY-76-C-04-0789)
(SAND-79-0868C; CONF-790805-3) Avail: NTIS HC A02/MF A01

A pair of in situ marine geotechnical instrumentation systems, capable of operating unattended for extended periods of time in remote locations, were designed and fabricated, and are currently undergoing testing. The seafloor earthquake measurement system measures the response of marine sediments to strong and moderate seismic activity. The geotechnically instrumented seafloor probe measures the in situ pore pressure in soft marine clays. The two systems have many common characteristics. Both systems consist of two principal subsystems: a seafloor data gathering package and a shipboard command and recording package. The seafloor packages are totally self-contained, and incorporate microprocessor-based electronics which control data collection, processing, and storage. Data collected and stored by the seafloor packages are transmitted on command to the command and recording package by a high-data-rate acoustic telemetry system. DOE

N80-13432# Oak Ridge National Lab., Tenn.
OPTIMIZATION OF AN ANALYTICAL ELECTRON MICROSCOPE FOR X-RAY MICROANALYSIS: INSTRUMENTAL PROBLEMS
J. Bentley, N. J. Zaluzec, E. A. Kenik, and R. W. Carpenter 1979 15 p refs Presented at the Scanning Electron Microscopy Conf., Washington, D.C., 16 Apr. 1979
(Contract W-7405-eng-26)
(CONF-790418-6) Avail: NTIS HC A02/MF A01

The complications which can arise in performing X-ray microanalysis in current analytical electron microscopes are discussed. Fluorescence by uncollimated radiation was studied. The source, distinguishing characteristics, effects on quantitative analysis and schemes for elimination or minimization as applicable to TEM/STEMs, D-STEMs and HVEMs are discussed. The local specimen environment is considered in the second major section, where again, detrimental effects on quantitative analysis and remedial procedures, particularly the use of low-background specimen holers, are highlighted. Finally, the detrimental aspects of specimen contamination, insofar as they affect X-ray microanalysis, are discussed. It is concluded that if the described preventive measures are implemented, reliable quantitative analysis is possible. DOE

N80-13433# Sandia Labs., Albuquerque, N. Mex.
PORTABLE HIGH-TEMPERATURE, HIGH-PRESSURE VISCOMETER DEVELOPMENT
R. C. Reineke Mar. 1979 23 p refs
(Contract EY-76-C-04-0789)
(SAND-78-1409) Avail: NTIS HC A03/MF A01

A field instrument for measuring the rheological characteristics of drilling mud at temperatures up to 260 C and pressures of 12,500 psi was developed. This instrument allows a direct determination of fluid viscosity under simulated downhole conditions. The instrument is comprised of a rotational viscometer packaged in a high temperature, high pressure vessel and weighs approximately 60 pounds. The design and construction of the instrument are described and the results of measurements of

six different drilling fluid formulations are presented. These test results show that water based samples exhibit a marked increase in viscosity with increasing pressures. In oil based muds the thinning effect caused by increasing temperature is partially compensated for by the thickening effect of increasing pressure. DOE

N80-13434# Allied Chemical Corp., Idaho Falls, Idaho.
LABORATORY DESIGN FOR MODERN ANALYTICAL INSTRUMENTS
G. V. Wheeler 1979 14 p refs Presented at Intern. Conf. on Atomic Spectroscopy, Cambridge, United Kingdom, 1 Jul. 1979 (Contract EY-76-C-07-1570)
(CONF-790702-1) Avail: NTIS HC A02/MF A01
The design of analytical chemistry laboratories housing spectroscopic instruments is discussed. DOE

N80-13435# Royal Aircraft Establishment, Farnborough (England).
NOTES ON THE TRANSIENT RESPONSES AND ERRORS OF SHOCK ACCELEROMETERS WITH SECOND-ORDER FILTERS
W. R. Macdonald London HMSO Jan. 1979 28 p refs
(RAE-TM-IT-179; BR66839) Avail: NTIS HC A03/MF A01
The response of accelerometers, with second-order filters, is considered for 1/2 sin and sin squared acceleration pulses. The time history of their integrated (velocity) response is also treated. Graphs relating the error in measuring peak acceleration to the filter parameters are given and the results are related to practical situations experienced when calibrating accelerometers. The effect of accelerometer nonlinearity when calibrating by velocity-change methods is briefly investigated and a method of measuring the nonlinearity is suggested. Author (ESA)

N80-13436# Oxford Univ. (England). Dept. of Engineering Science.
USER'S HANDBOOK FOR GT8 GALVANOMETER DRIVE AMPLIFIER SYSTEM
W. G. Wooster and M. L. G. Oldfield 1979 59 p
(OUEL-1284/79) Avail: NTIS HC A04/MF A01
The GT8 system of galvanometer drive amplifiers is described. The system was designed to prove as interface with multichannel ultraviolet chart recorders in such a way that the user is presented with a high input impedance voltage sensing input with a wide range of sensitivities. This, together with the type of input facilities expected of a modern cathode-ray oscilloscope, makes for a very versatile signal conditioning system. The design is particularly useful for the measurement of heat transfer measurements. Author (ESA)

N80-13070# Academy of Sciences (USSR), Moscow. Inst. of Science Research.
THE MULTIPURPOSE APPARATUS CRYSTAL FOR PROCESS EXPERIMENTS IN SPACE
A. Yu. Malinin, R. Z. Sagdeev, V. T. Khryapov, E. T. Solomin, V. I. Seliverstov, Yu. M. Zhelanni, A. F. Podolinni, and D. V. Bocharov *In* ESA Mater. Sci. in Space Jun. 1979 p 5-8 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13086# Centro Informazioni Studi Esperienze, Milan (Italy).
UHV-CHAMBER: THEORETICAL BACKGROUND AND FACILITY DEVELOPMENT
N. Adorni, G. Ghersini, P. G. Sona, F. Rossitto (Milan Polytech.), and G. Cortelazzi (Control Systems) *In* ESA Mater. Sci. in Space Jun. 1979 p 125-132 refs Sponsored by CNR (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13088# Battelle Inst., Frankfurt am Main (West Germany).
POSITIONING AND MIXING INSTRUMENTATION EMPLOYING ELECTROSTATIC AND ACOUSTIC PRINCIPLES
E. G. Lierke, W. M. Heide, R. Grossbach, and P. F. Clancy (ESTEC, Noordwijk, Netherlands) *In* ESA Mater. Sci. in Space Jun. 1979 p 149-157 refs (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13091# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
FUNCTIONAL PERFORMANCE OF THE ISOTHERMAL HEATING FACILITY FOR THE MATERIAL SCIENCE DOUBLE RACK
Joachim E. Geisel and Franz Hugo (Leybold Heraeus) *In* ESA Mater. Sci. in Space Jun. 1979 p 167-176 (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13092# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
EXPERIMENT MODULES AND FACILITIES IN TEXUS 1 AND 2
Joachim E. Geisel and Burkhard Franke *In* ESA Mater. Sci. in Space Jun. 1979 p 177-188 (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13093# Centre National d'Etudes Spatiales, Toulouse (France).
A CONTAINER FOR CONDITIONING SPACE EXPERIMENTS
F. Jamin Changeart and J. Cadars *In* ESA Mater. Sci. in Space Jun. 1979 p 189-199 In FRENCH and ENGLISH (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

36 LASERS AND MASERS

Includes parametric amplifiers.

N80-13437 Maryland Univ., College Park.
PHYSICAL PROCESSES AFFECTING THE PERFORMANCE OF HIGH-POWER, FREQUENCY-DOUBLED SHORT-PULSE LASER SYSTEMS: ANALYSIS, SIMULATION, AND EXPERIMENT Ph.D. Thesis
John James Degnan, III 1979 587 p
Avail: Univ. Microfilms Order No. 7926507
A compilation of the physical mechanisms which affect the propagation of radiation in high peak power and high average power, solid state laser amplifier chains and frequency doublers is presented along with an assessment of their impact on system design. The numerical methods employed in a computer program PULSE are described. They simulate the propagation of a cylindrically symmetric CW wave or repetitive pulse train through single-pass and double-pass amplifiers, lenses, mirrors, hard and soft apertures, magnifying optics, curved dielectric surfaces, third-order nonlinear Kerr and thermal media, and frequency doublers. Results are presented of experiments characterizing the University of Maryland, Nd:YAG oscillator/regenerative amplifier system and its performance and to suggest, on the basis of the theoretical and numerical results, optimum amplifier and frequency doubler configurations for generating the high peak and average powers required for precise laser ranging to extraterrestrial targets. Dissert. Abstr.

N80-13438*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NUCLEAR-PUMPED LASERS
Dec. 1979 140 p refs Proc. of Workshop held at Hampton, Va., 25-26 Jul. 1979
(NASA-CP-2107; L-13366) Avail: NTIS HC A07/MF A01 CSCL 20E
The state of the art in nuclear pumped lasers is reviewed. Nuclear pumped laser modeling, nuclear volume and foil excitation of laser plasmas, proton beam simulations, nuclear flashlamp excitation, and reactor laser systems studies are covered. For individual titles, see N80-13439 through N80-13453.

N80-13439*# Florida Univ., Gainesville.
UNIVERSITY OF FLORIDA NUCLEAR PUMPED LASER PROGRAM
Richard T. Schneider *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 1-10 (For primary document see N80-13438 04-36)

Avail: NTIS HC A07/MF A01 CSCL 20E

The mechanism of excitation of laser gases by fast ions (triton, proton, or fission fragments) and especially any role UF6 might play in radiative deexcitation of these gases were investigated. Population densities of excited important for laser action were obtained. Nuclear pumped CW-laser systems, especially He-Ne and CO2, were studied using steady state reactors. It was demonstrated that He-Ne lases in a CW-mode with nuclear pumping at both the red and the infrared transition. The infrared transition was observed to be superradiant. J.M.S.

N80-13440*# Florida Univ., Gainesville.
NUCLEAR-PUMPED CO2 LASER
Michael Rowe *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 11-18 (For primary document see N80-13438 04-36)
Avail: NTIS HC A07/MF A01 CSCL 20E

The He-3 (n,p)T reaction was examined as an energy source for a CO2 laser. For this purpose He-3 was added to a functioning CO2 electrically excited laser. Initially the laser was run electrically with 12 torr total pressure. The gas mixture was 1:1:8, CO2:N2:He. At zero reactor power, the laser was tested in place next to the core of the Georgia Tech. Research Reactor. After verification of laser action He-3 was added to the system. The He-3 partial pressures of 10 torr, 50 torr, and 300 torr were added in three separate reactor runs. Reactor power ranged from zero to 5 million watts, which corresponds to a peak flux of 10 to the 14th power/sq cm. At reactor powers greater than 10 kW, gain of up to 30 percent was shown. However, indications are this may be due to gamma excitation rather than caused by the He-3 (n,p)T reaction. These results do agree with the data of past CO2 nuclear pumped laser experiments. J.M.S.

N80-13441*# Florida Univ., Gainesville.
EXPERIMENTAL SETUP FOR DECOMPOSITION OF UF6
Michael Rowe *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 19-24 (For primary document see N80-13438 04-36)
Avail: NTIS HC A07/MF A01 CSCL 20E

The rate at which UF6 decomposes into UF5 and UF4 was determined as a function of neutron fluence. To study UF6 decomposition rate, an absorption cell for VUV and the associated VUV spectroscopy system was used to measure UF6 while under irradiation. The cell contains 50 torr of UF6 at room temperature to insure that the UF6 is in a gaseous state. It is shown that by determining the absorption coefficient below 2100A for UF6, above 2100A for F2, and at 4100A for cell degradation, UF6 decomposition can be measured at a neutron flux of 10 to the 12th power/sq cm for 72 continuous hours. J.M.S.

N80-13442*# Florida Univ., Gainesville.
CW NUCLEAR PUMPED LASING OF 3He-Ne
B. Dudley Carter *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 25-32 (For primary document see N80-13438 04-36)
Avail: NTIS HC A07/MF A01 CSCL 20E

The results of a study on the CW nuclear pumped lasing of the He-Ne system are presented. Preliminary experiments measured single pass gain for the 6328.2A laser transition at neutron fluxes up to 1 x 10 to the 14th power neutrons/sq cm sec. Peak gain for a 300 torr (He-3)-Ne (5:1 mixture) was found to be 8.84 dB/meter at a 2 x 10 to the 12th power neutrons/sq cm sec neutron flux. Further experiments measured the gain in the flux region from one million to 2 x 10 to the 12th power neutrons/sq cm sec. In addition, gain vs. probe laser intensity at various neutron fluxes was measured. These measurements resulted in the construction of a laser cavity and the subsequent CW nuclear pumped lasing at 6328.2A in (He-3)-Ne. Experiments were also carried out on the 3.39 micrometer superradiant line in (He-3)-Ne. On three separate occasions, at two different facilities, lasing was observed. Although (He-3)-Ne was found to have the lowest threshold for lasing found so far, it also had the lowest output power on the order of tens of microwatts. J.M.S.

N80-13443*# Florida Univ., Gainesville.
SPECTRAL EMISSION OF NUCLEAR EXCITED XeBr*
R. A. Walters *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 33-36 refs (For primary document see N80-13438 04-36)
Avail: NTIS HC A07/MF A01 CSCL 20E

The vacuum-ultraviolet spectroscopy system and MCFIG capsule were filled with a He-3:Ar:Xe:Br (534:195:12:6) torr mixture and irradiatied by a CW flux of 17 x 10 to the 11th power neutrons/sq cm sec. The XeBr* emission was observed, but the Br2 emission normally observed in argon-bromine mixtures predominates. This spectrum is typical of these mixtures with XeBr* probably peaking with 0.1 percent Bromine in 2 atmosphere argon with 2 percent xenon. The addition of a large partial pressure of He-3 produces additional unknowns. The typical vibrational structure of XeBr* was not observed. Sapphire emission continuums were present. Energy deposition was 0.43 watts and the capsule output under the XeBr* and Br2 bands was 0.0016 watts, giving an efficiency of 0.37 percent. J.M.S.

N80-13444*# Illinois Univ., Urbana. Fusion Studies Lab.
UNIVERSITY OF ILLINOIS NUCLEAR PUMPED LASER PROGRAM
George H. Miley *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 37-39 refs (For primary document see N80-13438 04-36)
Avail: NTIS HC A07/MF A01 CSCL 20E

The development of nuclear pumped lasers with improved efficiency, energy storage capability, and UF6 volume pumping is reviewed. Results of nuclear pumped laser experiments using a TRIGA-type pulsed reactor are outlined. J.M.S.

N80-13445*# Illinois Univ., Urbana. Fusion Studies Lab.
NUCLEAR PUMPING MECHANISMS IN ATOMIC CARBON AND IN EXCIMERS
M. A. Prelas *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 41-43 refs (For primary document see N80-13438 04-36)
Avail: NTIS HC A07/MF A01 CSCL 20E

Results of atomic carbon and XeF* nuclear pumping experiments are briefly discussed. Features of escimer lasers important for nuclear pumping are included. J.M.S.

N80-13446*# Miami Univ., Coral Gables, Fla.
LaRC RESULTS ON NUCLEAR PUMPED NOBLE GAS LASERS
R. J. DeYoung *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 45-60 refs (For primary document see N80-13438 04-36)
Avail: NTIS HC A07/MF A01 CSCL 20E

The recent experiment and theoretical results obtained for noble gas nuclear laser systems are presented. It is shown that the noble gas lasers are among the easiest systems to pump by nuclear excitation and as a result, all of the noble gases except He have lased under nuclear excitation. The noble gas systems are not ideal for high-power applications but they do give valuable insight into the operation and pumping mechanisms associated with nuclear lasers. At present, the Ar-Xe system is the best noble gas candidate for (U-235)F6 pumping. It appears that the quenching of Ar-Xe lasing is a result of the fluorine and not the uranium or fission fragments themselves. Thus, to achieve lasing with UF6, a fluorine compatible system must be found. R.E.S.

N80-13447*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NUCLEAR EXCITATION OF CO2 AND CO
N. W. Jalufka *In its* Nucl.-Pumped Lasers Dec. 1979 p 61-68 refs (For primary document see N80-13438 04-36)
Avail: NTIS HC A07/MF A01 CSCL 20E

A technology assessment of CO2 and CO nuclear pumped laser experiments is presented. R.E.S.

N80-13448*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NUCLEAR PUMPED LASER MODELING
J. W. Wilson and A. Shapiro *In its* Nucl.-Pumped Lasers Dec. 1979 p 69-82 (For primary document see N80-13438 04-36)
Avail: NTIS HC A07/MF A01 CSCL 20E

A model for an indirectly nuclear pumped laser experiment

was developed. The apparatus consists of the usual cylindrical neutron moderator enclosing a gas filled quartz cell. The quartz cell in this case has two concentric compartments; the larger output compartment is filled with He-3 and fluorescent gases which are coupled radiatively to the inner compartment which is filled with a lasing gas for efficient optical pumping. The fluorescent gas in this study was a mixture of Ar, Kr and F2. Perfluoroalkyliodide was chosen as the lasant material of the inner compartment. The degree of photoabsorption in the lasant gas was calculated. The kinetic efficiencies of various gas combinations in the outer fluorescence tube were then evaluated in order to maximize the fluorescence output in the iodine pump band. R.E.S.

N80-13449*# North Carolina State Univ., Raleigh. Dept. of Mechanical and Aerospace Engineering.

KINETICS OF A CO2 NUCLEAR PUMPED LASER

H. A. Hassan *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 83-90 (For primary document see N80-13438 04-36)

(Grant NsG-1058)

Avail: NTIS HC A07/MF A01 CSCL 20E

A detailed kinetic model is presented for the analysis of a nuclear pumped CO2-N2-He laser system. The model assumes that collisional recombination is the dominant pumping mechanism. The results show that, for mixtures typical of those employed in electric discharge systems, the gain coefficients are such that lasing is not expected to take place. On the other hand, concentrations of CO2 in the range 1/2 percent - 3 percent are optimal for direct nuclear pumping. Author

N80-13450*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

NUCLEAR PUMPED LASER RESEARCH AT THE JET PROPULSION LABORATORY

Gary R. Russell *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 91-93 refs (For primary document see N80-13438 04-36)

Avail: NTIS HC A07/MF A01 CSCL 20E

Using a partially nuclear excited xenon flashlamp to pump an iodine laser, laser pulse shapes were analyzed with and without nuclear flashlamp augmentation. The pulse shapes indicate that the deposition of nuclear energy is equally as effective as electrical energy deposition in producing laser pulse energy output. The amplification of the E-beam pumped CF3I was measured at pressures of several atmospheres. Preliminary data shows that, for a part of the iodine laser pulse, amplification of almost a factor of two is measured. This measurement indicates that the gain in an E-beam pumped CF3I is an order of magnitude greater than in the coaxial laser tube. R.E.S.

N80-13451*# Air Force Weapons Lab., Kirtland AFB, N. Mex.

NUCLEAR PUMPED LASERS: ADVANTAGES OF O2 (1 DELTA)

J. J. Taylor *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 109-112 (For primary document see N80-13438 04-36)

Avail: NTIS HC A07/MF A01 CSCL 20E

Nuclear pumped laser technology was evaluated as a possible future weapons contender. It was determined that in order to become a primary weapon the following engineering problems must be solved: shielding, heat dissipation, high efficiency fixed focus pumping, good beam quality, and thermal blooming. R.E.S.

N80-13452*# Army Missile Command, Redstone Arsenal, Ala.

SIMULATION STUDIES FOR A NUCLEAR PHOTON PUMPED EXCIMER LASER

Thomas G. Miller and John E. Hagefstration (Ballistic Missile Defense Advanced Technology Center, Huntsville, Ala.) *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 113-116 (For primary document see N80-13438 04-36)

Avail: NTIS HC A07/MF A01 CSCL 20E

Simulation studies were undertaken to determine the feasibility of a nuclear photon pumped excimer laser using a system where high pressure Xe is bombarded with electrons and protons to form 1720 A. Primary measurements included conversion efficiency and gain vs time measurements. R.E.S.

N80-13453*# United Technologies Research Center, East Hartford, Conn. Fluid Dynamics Lab.

CONCEPT FOR UF6-FUELED SELF-CRITICAL DNPL REACTOR SYSTEM

R. J. Rodgers *In* NASA. Langley Res. Center Nucl.-Pumped Lasers Dec. 1979 p 117-134 refs (For primary document see N80-13438 04-36)

Avail: NTIS HC A07/MF A01 CSCL 20E

An analytical study of a self-critical nuclear pumped laser system concept was performed. The primary emphasis was on a reactor concept which would use gaseous uranium hexafluoride (UF6) as the fissioning material. A reference configuration was selected which has a 3.2 cu m lasing volume as the reactor core. The core is composed of a series of hexagonal graphite tubes which are surrounded by a reflector-moderator composed either of heavy water or beryllium. Laser transitions requiring average fission power densities less than approximately 1 kW/cu cm for excitation are most attractive. Operation at wavelengths greater than approximately 400 nm may be required because of limitations imposed by the opacity of gaseous UF6. Further research directed toward identification of UF6 compatible lasing transitions is required. R.E.S.

N80-13454# Defence Research Establishment Valcartier (Quebec).

A PURELY CHEMICAL HBr LASER

S. J. Arnold and K. D. Foster Sep. 1978 19 p refs (AD-A060841; DREV-R-4129/78) Avail: NTIS HC A02/MF A01 CSCL 20/5

Purely chemical laser action in HBr has been achieved for the first time. Chlorine atoms produced by the reaction of NO with Cl O2 were reacted with molecular bromine to form bromine atoms which in turn reacted with HIQTO FORM vibrationally excited HBr. Multiline HBr laser output of 0.58 W originated from the Ps ub 1 yields O (4), P sub 1 yields O (5), and P sub 1 yields O(6) lines of the v=1 yields O vibrational band. GRA

N80-13455# International Business Machines Corp., Hopewell Junction, N. Y. East Fishkill Labs.

LIFETIME CONTROL IN SILICON THROUGH FOCUSED LASER BEAM DAMAGE Technical Report, 1 May - 31 Dec. 1978

G. H. Schwuttke and K. H. Yang 5 Feb. 1979 86 p

(Contract N00173-76-C-0303; ARPA Order 3231)

(AD-A072909; TR-22.2260) Avail: NTIS HC A05/MF A01 CSCL 20/8

This report consists of two chapters. Chapter I discusses minority carrier lifetime degradation in silicon as a result of 200 Kev argon and 80 Kev silicon implantation. The lifetime degradation is studied for the implantation dose range of 10 to the 11th power to 10 to the 16th power ions/cm sq. The lifetime degradation is different for argon and silicon implantation. For low argon implantation the decrease in lifetime is impurity controlled. At a higher dose the decrease in lifetime is caused by the argon impurity and by the crystal defects generated by the recrystallization of the amorphous damage layer. For silicon implantations the decrease in lifetime is caused by crystal defects only and is minor up to a dose of 10 to the 14th power Si(-)/cm sq. Chapter II reports results on buried layer gettering through high energy oxygen and argon implantations. High energy argon gettering depends on the implantation dose. Maximum gettering is obtained for high dose implantation. Oxygen gettering shows no implantation dose dependency. Remarkable gettering efficiencies are obtained for an implentation dose of 10 to the 11th power O(-)/cm sq. GRA

N80-13456# Naval Research Lab., Washington, D. C. Material Science and Technology Div.

APPLICATION OF COATINGS BY HIGH ENERGY CW LASERS Semiannual Report, 1 Apr. - 1 Oct. 1978

R. J. Schaeffer, J. D. Ayers, and T. R. Tucker Mar. 1979 36 p

(ARPA Order 3579)

(AD-A073347; AD-E000312; NRL-MR-3953) Avail: NTIS HC A03/MF A01 CSCL 11/3

The objective of this program is to apply coatings to the surface of metals using the high energy density heating of CW lasers. The coatings are applied by either the laser spray process,

in which powder is heated and propelled to the substrate surface for deposition, or by plasma spraying with subsequent laser remelt. This report describes the development of methods for carrying out and analyzing these processes, the selection of materials, and the early experimental results. The kinetics of laser spraying of aluminum oxide in air are reported. GRA

N80-13457# Army Missile Research and Development Command, Redstone Arsenal, Ala.
COMPILATION OF DATA RELEVANT TO NUCLEAR PUMPED LASERS, VOLUME 5
E. W. McDaniel, M. R. Flannery, E. W. Thomas, H. W. Ellis, and K. J. McCann Feb. 1979 470 p
(AD-A073575; DRDMI-H-78-1-Vol-5) Avail: NTIS HC A20/MF A01 CSCL 20/5

This volume, and volumes 3 and 4, contain a compilation of data relevant to nuclear pumped lasers and are part of a series on atomic and molecular data for gas laser research and development. The first two volumes, contained: Compilation of Data Relevant to Rare Gas-Rare Gas and Rare Gas-Monohalide Excimer Lasers by E. W. McDaniel, M. R. Flannery, H. W. Ellis, F. L. Eisele, W. Pope, and T. G. Roberts. GRA

N80-13458# Case Western Reserve Univ., Cleveland, Ohio.
DIPOLAR DEFECT STRUCTURE OF LASER AND OTHER TRANSPARENT MATERIALS Final Report, May 1976 - May 1979
Carl Andeen and Donald E. Schuele 15 Jul. 1979 19 p refs
(Grant DAAG29-76-G-0222)
(AD-A073815; ARO-13440.7-P) Avail: NTIS HC A02/MF A01 CSCL 20/5

The dipolar defects resulting from rare-earths doped in alkaline earth fluorides have been measured by the method of dielectric relaxation. These measurements have been made over the temperature range 5 K to 400 K and, in some cases, as a function of pressure. New relaxation peaks were discovered, particularly at low temperatures. The strengths of the various defects did not scale monotonically with dopant concentration. Measurements on crystals with two or more dopants enabled a positive identification of clustering. Studies were also carried out on alkaline earth fluorides doped with alkali metals, a series of optical glasses, and some semiconductors. A microprocessor controlled automatic capacitance bridge was developed and constructed and is operational. Advancements were made on the high pressure dielectric gauge. GRA

N80-13459# Wisconsin Univ. - Madison.
EXPERIMENTAL EVALUATION OF NEW SOLID STATE LASER SCHEMES Final Report, Nov. 1977 - Oct. 1978
William M. Yen May 1979 13 p refs
(Contract N00014-76-C-0402)
(AD-A073656) Avail: NTIS HC A02/MF A01 CSCL 20/5

Various schemes for tunable solid state lasers are discussed. Results of measurements of excited state absorption for YAG:Ce(3-) are presented. The potential of color center lasers for blue-green emission is examined. GRA

N80-13460# Los Alamos Scientific Lab., N. Mex.
EFFECT OF DEVIATIONS FROM THE MAXWELL DISTRIBUTION ON NEUTRON PRODUCTION IN LASER TARGETS
D. B. Henderson and A. G. Petschek Nov. 1978 16 p refs
(Contract W-7405-eng-36)
(LA-7532-MS) Avail: NTIS HC A02/MF A01

The ion distribution and the deuterium tritium fusion reactivity (sigma v) were calculated. Results are presented for the ratio of (sigma v) for a monoenergetic isotropic distribution to that for a Maxwell distribution, for the rate of approach of (sigma v) to the equilibrium value, and for the decay of (sigma v) due to fast ion losses. The main effect in the last case is due to energy losses, not to non-Maxwellian distribution. The effect is substantially different than previously reported. DOE

N80-13461# California Univ., Livermore. Lawrence Livermore Lab.
TIME DEPENDENT PROPAGATION OF HIGH-ENERGY LASER BEAMS THROUGH THE ATMOSPHERE, 4
J. R. Morris and J. A. Fleck, Jr. 15 Dec. 1978 35 p refs
(Contract W-7405-eng-48)
(UCRL-52654) Avail: NTIS HC A03/MF A01

Calculations are presented for combined t to the 3d power blooming and overlap blooming of a multipulse laser beam whose beam shape is a uniformly illuminated square aperture. Thermal conduction and intensity saturation models for simulation of laboratory scale experiments are described. A comparison of experimental data with calculation of combined t to the 3d power blooming and overlap blooming is discussed. A return wave algorithm for computing phase compensation for steady state cw or multipulse thermal blooming of lasers that emit significant radiation on more than one spectral line is described. DOE

N80-13462# Sandia Labs., Albuquerque, N. Mex.
TRANSMISSION OF FREE-RUNNING LASER PULSES OF HIGH ENERGY AND POWER DENSITIES THROUGH PREVIOUSLY GAMMA RADIATED FIBER WAVEGUIDES
M. J. Landry Mar. 1979 26 p refs
(Contract EY-76-C-04-0789)
(SAND-79-0441) Avail: NTIS HC A03/MF A01

Measurements of the coupling efficiency (output energy/input energy), input and output energy and power densities, the surface threshold damage levels and the optical damage in three types of fiber optic waveguides are described. The properties of fibers were measured using 400 micro s-duration Nd:glass laser pulses before and after irradiation with a Co -60 gamma ray source. DOE

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N80-13463 Stevens Inst. of Tech., Hoboken, N. J.
AN INVESTIGATION OF THE EFFICIENCY OF REGENERATIVE BLOWERS AND PUMPS Ph.D. Thesis
Joel Warren Hollenberg 1978 109 p
Avail: Univ. Microfilms Order No. 7925052

The parameters controlling the efficiency of regenerative pumps and blowers were investigated. Measurements made of the pressure, flow and torque at constant speed and clearance on a circular section regenerative blower were non-dimensionally correlated through an analysis based on the Euler equation, simplified and integrated, with the solution modified for viscous effects based on curved pipe flow studies. The correlation depends on a single experimental parameter. The correlation among torque, pressure and flow rate was used to examine the variation in efficiency-specific speed characteristic of regenerative turbomachines over the range of their probable designs. The maximum efficiency is shown to be a function of a radius ratio parameter and a friction head coefficient ratio. A computer generated parameter study based on these results is presented. Dissert. Abstr.

N80-13464 Northeastern Univ., Boston, Mass.
A FLUID MECHANICAL-KINETIC THEORY DESCRIPTION OF A SPHERICALLY SYMMETRIC DISCHARGE IN A NEUTRAL MEDIUM Ph.D. Thesis
Abdelhamid H. M. Hamdi 1978 219 p
Avail: Univ. Microfilms Order No. 7923535

The effect of negative corona discharge on a background of neutral atoms was studied. The boundary conditions at the discharging probe surface and a spherical shell located away from the probe surface were obtained. In spherical geometry, the governing differential equations were examined. It was found that the neutral particles have no mass flux with the assumption of spherical symmetry. Their number density showed an exponential decrease toward the probe surface. The ions' governing differential equations were reduced to one ordinary nonlinear differential equation which governs the potential distribution with a nondimensional parameter C [C alpha current x (probe radius) cubed]. Dissert. Abstr.

N80-13465 Dayton Univ., Ohio.
TRANSIENT THERMAL EFFECTS IN DISC BRAKES Ph.D. Thesis
Ben Joseph Brookman, Jr. 1979 467 p

Avail: Univ. Microfilms Order No. 7925693

The development of a general theoretical model for predicting temperatures within the stators, rotors, rim, torque tube, tire, fuse plug and bead seat of a typical disc brake assembly is described with emphasis on: (1) temperature measurement analysis, (2) theoretical analysis of brake and component parts, and (3) full-scale brake tests. Correlation of results showed that the one-dimensional axial and the one-dimensional radial models predict peak temperatures during a brake stop that are up to 31 percent and 16 percent higher than experiment, respectively. The two-dimensional model predicts peak temperatures within 5 percent of experiment in three out of the four cases considered, with the fourth case less than 8 percent. The peak temperature predictions within the torque tube, fuse plug, derive lug, bead seat and contained air were within 10 percent of experiment for most cases. Dissert. Abstr.

N80-13466 Virginia Polytechnic Inst. and State Univ., Blacksburg.
THE PERFORMANCE ESTIMATION OF AN AXIAL-FLOW COMPRESSOR STAGE USING THEORETICALLY DERIVED BLADE ELEMENT CHARACTERISTICS WITH EXPERIMENTAL COMPARISON Ph.D. Thesis
Ralph Raymond Jones, III 1979 252 p
Avail: Univ. Microfilms Order No. 7924114

A method is developed for the calculation of steady, quasi-three-dimensional, subsonic, compressible flow through a two-dimensional cascade of blades which includes the effects of viscosity. The prediction technique allows the calculation of the typical blade element characteristics of deviation angle and total pressure loss coefficient for a wide range of incidence angles. The spanwise performance of an axial-flow compressor stage is estimated by integrating the radial component of the momentum equation at the inlet guide vane exit/rotor entrance and rotor exit stations. A three stage axial-flow compressor with a design speed and mass flow rate of 17,000 RPM and 24.5 lbm/sec respectively, and a nominal pressure ratio of 1.2 per stage is used to evaluate the prediction technique. Dissert. Abstr.

N80-13467 Virginia Polytechnic Inst. and State Univ., Blacksburg.
EXPERIMENTAL AND PREDICTED PERFORMANCE FOR THE COMBUSTION OF A LOW HEATING VALUE GAS IN A SWIRL BURNER Ph.D. Thesis
James G. Rice 1979 169 p
Avail: Univ. Microfilms Order No. 7924136

A finite difference analysis of the flow and combustion processes of a low heating valve gas in a swirl burner is developed. The solution algorithm is given the acronym CENCIS, derived from centered-cell-implicitly-staggered. To illustrate the incorporation of the algorithm into a computer code, a sample program is developed to solve a simplified problem which has a closed form solution. Calculations are presented for the swirl burner, and the predicted results are compared with experimental data. The program used for the calculation of swirl burner performance, PRIMCO, includes variable density and viscosity effects and incorporates a two equation turbulence model for the Reynolds stress terms. Because of the use of the nonstaggered grid system, the CENCIS solution algorithm is less complicated than previous algorithms. It requires approximately one third the computations of the staggered grid approach. Dissert. Abstr.

N80-13468 Wisconsin Univ. - Madison.
INTERNAL COMBUSTION ENGINE SAMPLING PROBES: A STUDY OF SAMPLE-GAS ORIGINS, FLOW DISTURBANCES AND QUENCH-LAYER BIAS Ph.D. Thesis
Stephen Robert Turns 1979 332 p
Avail: Univ. Microfilms Order No. 7918169

Several gas-sampling characteristics of an electromagnet operated, intermittent-flow sampling probe and a continuous-flow sampling probe were investigated. Of the many sources for error in species concentration measurement, three were chosen for investigation: the flow disturbance associated with a probe's sink action, the flow disturbance associated with a probe's presence, and the bulk-gas sample bias caused by flame quenching at the probe's surface. Investigation of these error sources also provided knowledge about the physical origins of the sampled gas. Flow disturbance errors were determined principally by experiment, while estimates of the quench-layer bias were determined principally by mathematical modeling. The experimental investigation used a steady-flow rig which provided reproducible velocity and concentration fields for sampling. Dissert. Abstr.

N80-13469 Iowa Univ., Iowa City.
OPTIMAL DESIGN OF OPEN-LINKAGE MECHANICAL SYSTEMS Ph.D. Thesis
Yong-San Yoon 1979 109 p
Avail: Univ. Microfilms Order No. 7924546

The problem of determining those particular human body motions that optimize performance criteria is discussed. The solution algorithm is derived for a general open linkage system that may exhibit intermittent discontinuous motions and applied to a four-bar planar open chain linkage system representing the human body during a standing vertical jump. An optimization problem (open loop control) is formulated in which the objective function is the maximum height reached by the distal tip of the upper extremity segment (finger tip). An optimal solution of this constrained nonlinear programming problem is found using the method of steepest descent. Once the optimal design is determined, the associated kinematic behavior of the open linkage system and the optimal joint torques are easily determined. Numerical results are presented, using body segment parameters for a typical adult male and reasonable constraint values. Dissert. Abstr.

N80-13470 Iowa Univ., Iowa City.
DESIGN SENSITIVITY ANALYSIS AND OPTIMIZATION OF CONSTRAINED DYNAMIC SYSTEMS Ph.D. Thesis
Narayan Chandra Barman 1979 179 p
Avail: Univ. Microfilms Order No. 7924454

A systematic theory was derived and corresponding general computer program was developed for the design of constrained dynamic systems. The method automatically integrating the equations of motion and design sensitivity adjoin equations. The following branches of mathematics and mechanics were used in developing the method: (1) optimization, (2) rigid body mechanics, (3) numerical integration, and (4) matrix manipulation. Dissert. Abstr.

N80-13471 Virginia Polytechnic Inst. and State Univ., Blacksburg.
AN ANALYTICAL INVESTIGATION OF THREE-DIMENSIONAL VIBRATION IN GEAR-COUPLED ROTOR SYSTEMS Ph.D. Thesis
John William Daws 1979 423 p
Avail: Univ. Microfilms Order No. 7924099

An analysis of three dimensional forced vibration response of gear coupled rotor systems is presented. The time varying nature of the gear mesh stiffness is developed and compared to other published results. Hibner's branching technique is applied to the gear mesh to produce three dimensional coupling. The proposed analysis technique was used to predict the forced response of a set of high speed gear coupled turborotors for sixteen discrete frequencies. Bearing force level data obtained from the manufacturer is presented. Dissert. Abstr.

N80-13472*# Texas A&M Univ., College Station.
EFFECTS OF SOFT FOAM INSULATION IMPACT Final Report
James L. Rand and David J. Norton [1979] 96 p
(Contract NAS9-15962)
(NASA-CR-160400) Avail: NTIS HC A05/MF A01 CSCL 20L

High temperature reusable surface insulation (HTRSI) tiles were impacted by a variety of foam insulation materials typical of the debris expected to strike the shuttle orbiter during the initial phases of flight. Failure of the HIRSI coating was strongly dependent on the density and size of the projectile. The failure threshold was as low as 140 ft/sec for rubber and as high as 740 ft/sec for styrofoam. In addition, the impact pressure was measured for a variety of debris materials as a function of velocity. K.L.

N80-13473*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INVESTIGATION INTO THE EFFECT OF PLASMA PRETREATMENT ON THE ADHESION OF PARYLENE TO VARIOUS SUBSTRATES
T. Riley, T. Cobo Mahuson, and K. Seibert 1979 20 p refs

Presented at the Seminar of Cleaning, Finishing and Coating Processes, Los Angeles, 5-6 Feb. 1979; sponsored by the Soc. for the Advan. of Mater. and Process Eng.
(NASA-TM-79224; E-119) Avail: NTIS HC A02/MF A01 CSCL 11A

A procedure is described for using argon and oxygen plasmas to promote adhesion of parylene coatings upon many difficult-to-bond substrates. Substrates investigated were gold, nickel, kovar, teflon (FEP), kapton, silicon, tantalum, titanium, and tungsten. Without plasma treatment, 180 deg peel tests yield a few g/cm (oz/in) strengths. With dc plasma treatment in the deposition chamber, followed by coating, peel strengths are increased by one to two orders of magnitude. A.R.H.

N80-13474*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
FEASIBILITY OF SiC COMPOSITE STRUCTURES FOR 1644 DEG GAS TURBINE SEAL APPLICATIONS Final Report, 28 Apr. - 30 May 1979
R. Darolia May 1979 109 p ref
(Contract NAS3-20082)
(NASA-CR-159597; R79AEG625) Avail: NTIS HC A06/MF A01 CSCL 11A

The feasibility of silicon carbide composite structures was evaluated for 1644 K gas turbine seal applications. The silicon carbide composites evaluated consisted of Si/SiC Silcomp (Trademark) - and sintered silicon carbide as substrates, both with attached surface layers containing BN as an additive. A total of twenty-eight candidates with variations in substrate type and density, and layer chemistry, density, microstructure, and thickness were evaluated for abradability, cold particle erosion resistance, static oxidation resistance, ballistic impact resistance, and fabricability. The BN-free layers with variations in density and pore size were later added for evaluation. The most promising candidates were evaluated for Mach 1.0 gas oxidation/erosion resistance from 1477 K to 1644 K. The as-fabricated rub layers did not perform satisfactorily in the gas oxidation/erosion tests. However, preoxidation was found to be beneficial in improving the hot gas erosion resistance. Overall, the laboratory and rig test evaluations show that material properties are suitable for 1477 K gas turbine seal applications. J.M.S.

N80-13475# Pratt and Whitney Aircraft Group, West Palm Beach, Fla.
DEVELOPMENT OF MAINSHAFT HIGH-SPEED CYLINDRICAL ROLLER BEARINGS FOR GAS TURBINE ENGINES Interim Report, 1 Apr. 1977 - 1 Oct. 1978
P. F. Brown, L. J. Dobek, J. D. Robinson, and J. R. Miner Oct. 1978 106 p refs
(Contracts N00140-76-C-0383; MIPR-FY-1455-76-00623)
(AD-A073381; FR-11453) Avail: NTIS HC A06/MF A01 CSCL 21/5

This combined analytical and experimental program is aimed at generating a manual that will permit the design of 3.0 MDN cylindrical roller bearings. The roller bearing analysis will be correlated with the results from a series of bearing tests designed to determine, by statistical methods, the effect of geometrical variables on bearing performance. An existing quasi-static design optimization system was previously upgraded and the basic analyses for use in developing a program to predict the dynamic behavior of roller bearing components was completed. A study identified a total of thirty separate bearing parameters that can influence roller skewing and skidding. Two groups of 124 mm roller bearing designs were then prepared using statistical design techniques and incorporating parameters from the list of thirty. Fabricated of full-scale bearing hardware was completed and testing was completed. Results indicate that roller end wear is significantly affected by roller corner radius runout. GRA

N80-13476# Babcock and Wilcox Co., Alliance, Ohio. Research and Development Div.
DEVELOPMENT OF AUTOMATED WELDING PROCESSES FOR FIELD FABRICATION OF THICK-WALLED PRESSURE VESSELS: ELECTRON BEAM METHOD Quarterly Report, 1 Jul. - 30 Sep. 1978
Charles M. Weber 1978 26 p refs
(Contract EF-77-C-01-2606)
(DOE/ET-2606/4; QR-4) Avail: NTIS HC A03/MF A01

The development of 4-1/2 inch deep partial penetration electron beam welding procedures is reported. A total of 257 welds were made to date. Several defects were encountered and successfully eliminated. The occurrence of a necklace defect, which has been shown to be a cold shut resulting from improper solidification, has not yet been eliminated. It was observed that the beam oscillation pattern is influential on the behavior of the weld cavity during welding. In the vertical welding position, it was determined that the use of a welding shoe is required. DOE

N80-13477# California Univ., Berkeley. Lawrence Berkeley Lab.
HYBRID RANDOM CHOICE METHOD WITH APPLICATION TO INTERNAL COMBUSTION ENGINES 2
G. A. Sod (Wisconsin Univ., Madison) Jun. 1979 16 p refs Presented at Intern. Symp. on Combust. Processes, Karpacz, Poland, 26 Aug. 1979
(Contracts W-7405-eng-48; EY-76-C-02-3077)
(LBL-9423; CONF-7908040-1) Avail: NTIS HC A02/MF A01

A numerical procedure was introduced for solving one-dimensional equations of gas dynamics for a cylindrically or spherically symmetric flow. This method was generalized to the two-dimensional equations of gas dynamics in a cylindrical geometry. This is coupled at the boundary with a new grid free method for introducing viscous effects, where the computational elements are segments of vortex sheets and circular vortex filaments. Examples are given for flow in a motored engine chamber during intake and compression strokes. DOE

N80-13478# Idaho National Engineering Lab., Idaho Falls.
AUTOMATED WELDING OF NUCLEAR PIPING SYSTEMS
D. W. Hood 1979 5 p refs Presented at AWS Maintenance Welding in Nuclear Power Plants Conf., Atlanta, 6 Aug. 1979
(Contract EY-76-C-07-1570)
(CONF-790841-1) Avail: NTIS HC A02/MF A01

Among various pipe welding processes, the only one developed for mechanized and automated nuclear piping welding is the gas tungsten arc welding (GTAW) process. Improvements in GTAW power supplies and control systems, aided commercialization of the process, but the main element and pacing item has been the welding head itself. The status of mechanized and automated nuclear pipe welding is reviewed with emphasis on basic process equipment, joint design, fit-up requirements, welding parameters, and productibility. Anticipated developments in automated systems are discussed. DOE

N80-13479# Sandia Labs., Albuquerque, N. Mex.
METHOD FOR DESCRIBING NEARLY NORMAL PENETRATION OF AN OGIVE NOSED PENETRATOR INTO TERRESTRIAL TARGETS
N. T. Davie Jun. 1979 61 p refs
(Contract EY-76-C-04-0789)
(SAND-79-0721) Avail: NTIS HC A04/MF A01

The concept of an expanding spherical cavity is used as the basis of a method which allows the prediction of axial and lateral forces on the penetrator as well as complete trajectory information. Predictions based on this model compare favorably with experimental results. DOE

N80-13480# McAlvery and Associates, Hoboken, N. J.
IMPACT OF FLYWHEEL-TRANSMISSIONS ON AUTOMOBILE PERFORMANCE: A LOGICAL BASIS FOR EVALUATION
R. F. McAlvery, III 9 Apr. 1979 31 p refs
(Contract W-7405-eng-48)
(UCRL-52758) Avail: NTIS HC A03/MF A01

The application of flywheel-transmissions to electric vehicles and to petroleum-fueled automobiles was analytically investigated. Simple algebraic equations were developed that describe an automobile's total (laden) mass and energy economy as a function of mission requirements (i.e., payload, range, and drive-cycle acceleration demand). The equations can be used to evaluate the impact of a flywheel-transmission on an automobile's mass and energy economy. DOE

N80-13481# Oak Ridge National Lab., Tenn.
STATISTICAL TECHNIQUES FOR AUTOMATING THE

DETECTION OF ANOMALOUS PERFORMANCE IN ROTATING MACHINERY
K. R. Piety and T. E. Magette (Tennessee Univ., Knoxville) 1979 24 p Presented at the CAM-1 Intern. Spring Seminar, New Orleans, 9 Apr. 1979
(Contract W-7405-eng-26)
(CONF-790435-2) Avail: NTIS HC A02/MF A01

The level of technology utilized in automated systems that monitor industrial rotating equipment and the potential of alternative surveillance methods are assessed. It is concluded that changes in surveillance methodology would upgrade ongoing programs and yet still be practical for implementation. An improved anomaly recognition methodology is formulated and implemented on a minicomputer system. The effectiveness of the monitoring system was evaluated in laboratory tests on a small rotor assembly, using vibrational signals from both displacement probes and accelerometers. Time and frequency domain descriptors were selected to compose an overall signature that characterizes the monitored equipment. Limits for normal operation of the rotor assembly were established automatically during an initial learning period. Thereafter, anomaly detection was accomplished by applying an approximate statistical test to each signature descriptor. DOE

N80-13482# Sandia Labs., Livermore, Calif. Model Shops and Inspection Div.
DATA ACQUISITION SYSTEM FOR THE HAMILTON STANDARD W2 ELECTRON BEAM WELDER
James Hopwood Jun. 1979 68 p
(Contract EY-76-C-04-0789)
(SAND-79-8014) Avail: NTIS HC A04/MF A01

The operation of a microprocessor-based program controller and calculator designed to perform on-line weld parameter sampling is described. The parameters sampled are beam current, accelerating voltage, focus-coil current, workpiece rpm, and filament voltage. Sampling in analog form occurs in preselected angular rotation increments from 1 to 9 degrees. There are three data printout options: (1) all data displayed; (2) only out of tolerance values displayed; and (3) differences between nominal and sampled values in excess of preselected error bands displayed. A magnetic tape cartridge unit allows long term data storage and easy retrieval. The logic principles, circuitry, and programming are described in detail. DOE

N80-13483# Columbia Univ., New York. School of Mines.
FATIGUE AND CREEP BEHAVIOR OF Si3N4 AND SiC FOR GAS TURBINE APPLICATIONS Final Report
J. K. Tien, R. M. Arons, and L. Roth May 1979 95 p refs
(EPRI Proj. 271)
(EPRI-FP-1060) Avail: NTIS HC A05/MF A01

Creep characteristics were assessed in uniaxial tensile lading and fatigue properties were determined at ultrasonic frequencies. Mechanical response of these ceramics was found to be flaw size dependent. A threshold stress exists below which these ceramics are fatigue resistant. Creep response in hot-pressed silicon nitride was characterized by parallel processes, a persistent nonrecoverable plastic deformation and recoverable viscoelastic deformation. A steady-state component of creep was not found. An improved model for the creep process was developed to account for the creep and recovery behavior. DOE

N80-13484# Babcock and Wilcox Co., Alliance, Ohio. Research and Development Div.
DEVELOPMENT OF AUTOMATED WELDING PROCESSES FOR FIELD FABRICATION OF THICK-WALLED PRESSURE VESSELS: ELECTRON BEAM METHOD Quarterly Report, 1 Oct. - 31 Dec. 1978
C. M. Weber 1978 28 p
(Contract EF-77-C-01-2606)
(FE-2606-5; QR-5) Avail: NTIS HC A03/MF A01

An electron beam welding procedure for welding 8 in. thick SA 387 Grade 22 Class 2(2-1/4 Cr-1 Mo) steel was developed. A total of 324 welds were made. A beam oscillation pattern, the horseshoe pattern was successfully used to make defect-free, partial penetration welds in the horizontal position. An 8 in. thick, defect-free weld was made. Determination of the optimum welding procedure has not yet been made though. For welding in the vertical position, a shoe was designed and used to make void-free, partial penetration welds. DOE

N80-13485# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hardthausen (West Germany). Inst. fuer Chemische Antriebe und Verfahrenstechnik.
EXPERIMENTAL INVESTIGATION OF A SOLID FUEL RAMJET
Hendrik R. Lips, Robert H. Schmucker, and I. Lee Witbracht 1978 53 p refs
(DFVLR-FB-78-27) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 20,20

An experimental investigation of the internal ballistics, combustion efficiency, motor performance, and blow-off limits of a solid fuel ramjet motor was conducted in order to establish the design principles for the construction of a satisfactory combustor. In these connected-pipe test firings the effects of chamber pressure, air specific mass flow, burning time, flameholder design, inlet velocity, motor size, and fuel composition were investigated and correlations obtained. A simple theoretical model concerning flame stabilization, reattachment point and upper and lower combustion limits gives adequate agreement with the experimental test results. Author (ESA)

N80-13082# Bundesanstalt fuer Materialpruefung, Berlin (West Germany).
BRAZING UNDER MICROGRAVITY: TEXUS 2 EXPERIMENT
N. Philippovich (Vienna Univ.), R. Stickler (Vienna Univ.), K. Frieler (Vienna Univ.), and W. Bathke *In* ESA Mater. Sci. in Space Jun. 1979 p 95-100 refs Sponsored in cooperation with Bundesmin. fuer Forsch. U. Technol. and Austrian Bundesmin. fuer Wiss. U. Forsch. (For primary document see N80-13069 04-12)
Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13301# Kobe Univ. (Japan).
STABILITY PROBLEMS ON ROTOR SYSTEMS
T. Iwatsubo *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 3 Mar. 1979 p 17-26 refs (For primary document see N80-13298 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington D. C. 20375 CSCL 13/9

N80-13303 Rochester Inst. of Tech., N. Y.
DAMPING PROPERTIES OF TURBINE BLADES
N. F. Rieger *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 4 Apr. 1979 p 3-6 refs (For primary document see N80-13302 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 13/9

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N80-13486 Syracuse Univ., N. Y.
STOCHASTIC MODELLING FOR RELIABILITY AND OTHER PERFORMANCE MEASURES OF SOFTWARE SYSTEMS WITH APPLICATIONS Ph.D. Thesis
Kazuhira Okumoto 1979 215 p
Avail: Univ. Microfilms Order No. 7925593

The development of stochastic models for software failures in large scale systems is discussed. The models whose parameters have a physical interpretation, and which can yield various quantitative measures for software performance assessment are described. The applicability of the models over a broad class of software systems and the estimability of parameters when the available data is in the form of time between failures, or as number of failures in given time intervals is considered. A Markovian model is developed under the assumption of imperfect debugging, and expressions are derived for performance measures such as the distribution of time to a completely debugged system,

distribution of the number of remaining errors and software reliability. Methods are discussed for obtaining the maximum likelihood estimates and confidence regions for the parameters N (the initial error content), q (probability of imperfect debugging), and lambda (failure rate per error). Dissert. Abstr.

N80-13487 Cornell Univ., Ithaca, N. Y.
LIMIT THEOREMS FOR THE RELIABILITY OF SERIES-PARALLEL LOAD-SHARING SYSTEMS Ph.D. Thesis
Richard Lyttleton Smith 1979 156 p
Avail: Univ. Microfilms Order No. 7926964

The loading behavior of a series-parallel structure, in which individual elements are connected in parallel, are then arranged in series to form a system, and studied. Specifically, two loading behaviors were focused upon: equal load-sharing, in which the load is distributed equally over unfailed elements within each component, and local load-sharing, in which the whole of the load of failed elements is transferred to adjacent unfailed elements in a circular configuration. Mathematical models using techniques of the classical extreme value theory are presented for each type of load-sharing. Dissert. Abstr.

N80-13488*# Massachusetts Inst. of Tech., Cambridge.
ULTRASONIC ATTENUATION AS AN INDICATOR OF FATIGUE LIFE OF GRAPHITE/EPOXY FIBER COMPOSITE Final Report
James H. Williams, Jr. and Beth Doll Dec. 1979 22 p refs
(Grant NsG-3210)
(NASA-CR-3179) Avail: NTIS HC A02/MF A01 CSCL 14D

The narrow band ultrasonic longitudinal wave velocity and attenuation were measured as a function of the transfiber compression-compression fatigue of unidirectional graphite/epoxy composites. No change in velocity was detected at any point in fatigue life. For specimens fatigued at 80% of static strength, there was generally a 5% to 10% increase in attenuation, however, this increase does not appear to be a satisfactory indicator of fatigue life. On the other hand, there appears to be a correlation between initial attenuation (measured prior to cycling) and cycles to fracture. Initial attenuation as measured at 1.5 MHz and 2.0 MHz appears to be a good indicator of relative fatigue life. Author

N80-13489*# Massachusetts Inst. of Tech., Cambridge.
ULTRASONIC ATTENUATION AND VELOCITY IN AS/3501-6 GRAPHITE/EPOXY FIBER COMPOSITE Final Report
James H. Williams, Jr., Hamid NayebHashemi, and Samson S. Lee Dec. 1979 37 p refs
(Grant NsG-3210)
(NASA-CR-3180) Avail: NTIS HC A03/MF A01 CSCL 14D

The ultrasonic group velocity and attenuation were measured as a function of frequency for longitudinal and shear waves in the epoxy matrix (3501-6) and in the principal directions of the unidirectional graphite/epoxy composite (AS/3501-6). Tests were conducted in the frequency ranges 0.25 Mz to 14 MHz and 0.5 Mz to 3 MHz for longitudinal and shear wave modes, respectively. The attenuation increased with frequency for all wave modes, but the group velocity was independent of frequency for all wave modes. The effects of pressure and couplant at the transducer-specimen interface were studied and it was found that for each transducer type there exists a frequency dependent 'saturation pressure' corresponding to the maximum output signal amplitude. K.L.

N80-13490*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MODIFIED AEROSPACE RELIABILITY AND QUALITY ASSURANCE METHOD FOR WIND TURBINES
William E. Klein 1980 9 p Proposed for presentation at the Ann. Reliability and Maintainability Symp., San Francisco, 22-24 Jan. 1980
(NASA-TM-79284; DOE/NASA/20370-79/18; E-211) Avail: NTIS HC A02/MF A01 CSCL 14D

The safety, reliability, and quality assurance (SR&QA) approach developed for the first large wind turbine generator project is described. The SR&QA approach was used to assure that the machine would not be hazardous to the public or operating personnel, would operate unattended on a utility grid, would demonstrate reliable operation and would help establish the quality assurance and maintainability requirements for future wind turbine projects. A modified failure modes and effects analysis during the design phase, minimal hardware inspections during parts fabrication, and three simple documents to control activities during machine construction and operation were presented. R.C.T.

N80-13491# Rome Air Development Center, Hanscom AFB, Mass.
RELIABILITY AND MAINTAINABILITY MANAGEMENT MANUAL
Anthony Coppola and Alan N. Sukert Jul. 1979 158 p refs (AF Proj. 2338)
(AD-A073299; RADC-TR-79-200) Avail: NTIS HC A08/MF A01 CSCL 09/2

This manual provides a guide to Air Force program managers, at all levels, for the planning, organizing, manning, leading and controlling of cost-effective reliability and maintainability programs in all phases of acquisition. It addresses both hardware and software reliability. GRA

N80-13492# Illinois Univ. at Chicago Circle, Chicago. Dept. of Mathematics.
EXTENSIONS OF A SIMPLE MODEL WITH APPLICATIONS IN RELIABILITY, EXTINCTION OF SPECIES, INVENTORY DEPLETION AND URN SAMPLING Interim Report
Emad ElNeweihi Jul. 1979 22 p refs
(Grant AF-AFOSR-3050-76; AF Proj. 2304)
(AD-A073814; AFOSR-79-0975TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A series parallel system which consists of cut sets is studied. Several equivalent expressions for the probability that a specified member of the cut set fails first are discussed. A generalization of the system is derived for the probability that a member of the cut set fails in the Rth place. Applications of this system in the study of reliability, extinction of species, inventory depletion, and urn sampling are discussed. A.W.H.

N80-13493# Oklahoma State Univ., Stillwater. Fluid Power Research Center.
MERADCOM/OSU HYDRAULIC SYSTEM RELIABILITY PROGRAM Final Report, Jun. 1978 - May 1979
May 1979 348 p refs
(Contract DAAK70-77-C-0097)
(AD-A073789; OSU-FPRC-9MI) Avail: NTIS HC A15/MF A01 CSCL 13/7

The purpose of the Oklahoma State University/U.S. Army Mobility Equipment Research and Development Command Program is to provide the military with tools for the scientific appraisal of fluid power systems. Section I presents a detailed account of the project activities concerning hydraulic pump specifications. Included are an OSU proposed revision of Army pump specification MIL-P-52675 and two proposed test procedures for which no industrially recognized standards exist at present. Also included is a discussion and justification of the proposed specification and test procedures. Section II presents the details of the project activities concerning hydraulic valve specifications. Tests have been conducted based on Army specification MIL-V-52688 and the test results are discussed. OSU proposed revision of MIL-V-52688 is presented including additional test procedures that are considered necessary for Army valve specification. The project activities concerning hydraulic cylinder specifications are detailed in Section III. Included is an OSU proposed revision of Army cylinder specification MIL-L-52762. Also included is a summary of an industrial survey conducted on hydraulic cylinders and discussion and justification of the proposed specification and test procedures. GRA

N80-13494# Sandia Labs., Albuquerque, N. Mex.
METHOD FOR ACCELERATED AGING UNDER COMBINED ENVIRONMENTAL STRESS CONDITIONS
K. T. Gillen 1979 10 p refs Presented at JOWOG-28, Albuquerque, N. Mex., 11 Jun. 1979
(Contract DE-AC04-76DP-00789)
(SAND-79-0930C; CONF-790632-1) Avail: NTIS HC A02/MF A01

An accelerated aging method which can be used to simulate

aging in combined stress environmental situations is described. It is shown how the assumptions of the method can be tested experimentally. Aging data for a chloroprene cable jacketing material in single and combined radiation and temperature environments are analyzed and it is shown that these data offer evidence for the validity of the method. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N80-13495 Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 11, NUMBER 2
Judith Nagle-Eshelman, ed. Feb. 1979 85 p refs
(AD-A065807) Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

Reviews of shock and vibration analyses in relation to structural design and design criteria are presented. Included are studies of structural optimization problems, frequency domain post test analysis of vibration data, and approximate methods for determining the vibrational modes of membranes. For individual titles, see N80-13496 through N80-13498.

N80-13496 Indian Inst. of Tech., Kanpur.
STRUCTURAL OPTIMIZATION UNDER SHOCK AND VIBRATION ENVIRONMENT
S. S. Rao *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 2 Feb. 1979 p 3-13 refs (For primary document see N80-13495 04-39)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

Structural optimization, defined as the evolution of a structural design that satisfies a set of functional requirements and that, in terms of a predefined criterion, is the best of all such acceptable designs is discussed. Structural optimization problems are presented and analyzed. The problems are classified according to major constraint-e.g., natural frequency, flutter, dynamic response, and chatter stability. Each class is discussed. Approximate analysis techniques and some recent work on optimization methods, as applied to the design of structures, are presented. Structural optimization problems in need of further investigation are summarized. A.W.H.

N80-13497 Polytechnic Inst. of Bucharest (Rumania).
ANALYSIS TECHNIQUES OF EXPERIMENTAL FREQUENCY RESPONSE DATA
M. Rades *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 2 Feb. 1979 p 15-24 refs (For primary document see N80-13495 04-39)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

Techniques for frequency domain post test analysis of vibration data are reviewed. Emphasis is on procedures for curve fitting algebraic expressions of transfer functions to experimentally measured frequency response data for systems with nonproportional damping and/or closely spaced modes. A.W.H.

N80-13498 Adelaide Univ. (Australia).
A REVIEW OF APPROXIMATE METHODS FOR DETERMINING THE VIBRATIONAL MODES OF MEMBRANES
J. Mazumdar *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 2 Feb. 1979 p 25-32 refs (For primary document see N80-13495 04-39)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

Approximate methods for determining vibrational modes of membranes are reviewed. The review is divided into linear analysis and nonlinear analysis. Included are discussions on free vibration, forced vibration, and future research areas. A.W.H.

N80-13499 Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 11, NUMBER 6
Judith Nagle-Eshelman, ed. Washington DOD Jun. 1979 91 p
(AD-A070464/3) Avail: SVIC, Code 8404, Naval Research Lab., Washington, D.C. 20735 CSCL 20/11

The effects of vibration on dynamic cable response are reviewed with emphasis given to developments in ocean cable analysis. Methods of reduction of vibration of orthotropic plates are considered. Instrumentation used to measure shock and vibration are described. For individual titles, see N80-13500 through N80-13501.

N80-13500 Portland State Univ., Oreg.
CURRENT METHODS FOR ANALYZING DYNAMIC CABLE RESPONSE
H. J. Migliore and R. L. Webster *In* SVIC Shock and Vibration Digest, Vol. 11, No. 6 Jun. 1979 p 3-16 refs (For primary document see N80-13499 04-39)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D.C. 20735 CSCL 20/11

Methods for analysis of cable dynamics are reviewed with emphasis given to developments in ocean cable analysis. Specific discussions are given on the lumped parameter, finite element methods, and the method of weighted residuals. R.C.T.

N80-13501 Chubu Inst. of Tech., Kasugai (Japan).
REDUCTION METHODS FOR PROBLEMS OF VIBRATION OF ORTHOTROPIC PLATES. PART 2: GENERALIZED REDUCTION METHOD FOR GENERALLY ORTHOTROPIC PLATES WITH ARBITRARY SHAPE
T. Sakata *In* SVIC Shock and Vibration Digest, Vol. 11, No. 6 Jun. 1979 p 19-22 refs (For primary document see N80-13499 04-39)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D.C. 20735 CSCL 20/11

A generalized reduction method to derive an approximate formula for estimating the natural frequency of an orthotropic plate is described. The natural frequencies of the isotropic plate are used. They are reduced without solving the differential equation governing free vibration of the orthotropic plate. R.C.T.

N80-13502 Iowa Univ., Iowa City.
DYNAMIC ANALYSIS OF FLEXIBLE MECHANISMS Ph.D. Thesis
Ji Oh Song 1979 126 p
Avail: Univ. Microfilms Order No. 7924533

A method for transient dynamic analysis of planar mechanisms consisting of flexible members is developed, accounting for coupled large displacements and small elastic deformations. A computer code that systematically constructs and solves the equations of motion of general planar flexible mechanisms is developed. Numerical results for four example problems are presented to demonstrate the effectiveness of the theory and numerical analysis methods. Agreement of results obtained by the present method and results available in the literature is good. The method provides a general formulation without linear superposition assumptions of small elastic deformations on large displacements. It consists of systematic geometry and automated generation and solution of the equations of motion.
Dissert. Abstr.

N80-13503 Syracuse Univ., N. Y.
MODELLING OF CRACK TIP DEFORMATION WITH FINITE ELEMENT METHOD AND ITS APLICATIONS Ph.D. Thesis
Chuang-Yeh Yang 1979 125 p
Avail: Univ. Microfilms Order No. 7925610

A finite element computer program using the initial stress approach of elastic-plastic analysis was developed. Crack closure stresses were calculated for three different models. It was concluded that: (1) the closure stress is highest in the strip necking model, lowest in the plane strain model, and intermediate in the plane stress model; and (2) the crack closure stress decreases if the separation occurs before the stress reaches the maximum value. Nonpropagating fatigue cracks in the two phase martensitic-ferritic steels were also investigated. Unzipping

increments were calculated for different crack lengths. At a prescribed stress intensity level, the shorter the crack length, the greater the unzipping increment is. This means that the shorter crack will grow faster than the longer one if both are subjected to the same K-level. Dissert. Abstr.

N80-13504 Virginia Polytechnic Inst. and State Univ., Blacksburg.
OPTIMAL DESIGN OF ELASTIC STRUCTURES FOR STABILITY UNDER MULTIPLE LOADS Ph.D. Thesis
Hari Kertonadi Turner 1979 216 p
Avail: Univ. Microfilms Order No. 7924150

The structure's buckling load was optimized by varying the mass distribution and by enlarging the stability boundary in the load-space as much as possible. The finite element technique is used, and optimization is carried out by an iterative procedure utilizing the gradient and optimality criterion methods. The elastic structures considered are: columns with pinned ends and clamped ends subjected to an axial end load and an axial distributed load due to self-weight; columns attached to an elastic foundation with pinned ends and clamped ends, also subjected to an axial end load and an axial distributed load due to self-weight; a pinned-pinned rotating shaft with an axial load; a pinned-pinned pipe conveying fluid and compressed by an axial load; a one-bay frame with clamped supports, subjected to two vertical loads; and a two-bay frame with clamped supports, subjected to three vertical loads. Dissert. Abstr.

N80-13505 Northwestern Univ., Evanston, Ill.
ELASTODYNAMIC DIFFRACTION AND RADIATION PROBLEMS Ph.D. Thesis
John Gregory Harris 1979 247 p
Avail: Univ. Microfilms Order No. 7927362

The diffraction of a cylindrical longitudinal pulse by a semi-infinite, traction free slit located in an elastic solid was solved both asymptotically and exactly. The effect of the curvature of the incident pulse on the scattered pulses was studied. In addition, the radiation emitted by a planar, growing crack with an edge of arbitrary curvature was treated asymptotically in order to determine the effect of the curvature of the growing crack edge on the radiated pulses. The asymptotic solutions are based upon a geometrical theory of wave propagation that gives an approximation to the various elastic pulses near their wave fronts. Dissert. Abstr.

N80-13506 Kentucky Univ., Lexington.
A NEW EQUILIBRIUM FINITE ELEMENT ANALYSIS OF STRESSES IN ORTHOTROPIC CYLINDERS WITH TEMPERATURE DEPENDENT MATERIAL PROPERTIES Ph.D. Thesis
Muhammad Abul Kalam 1979 164 p
Avail: Univ. Microfilms Order No. 7927685

An equilibrium finite element model was developed in order to determine thermal stresses in orthotropic cylinders with complicated material behavior. The model was based on the conditions of static equilibrium with no body forces in terms of a cylindrical coordinate system. The finite element method was utilized in determining steady state thermal stresses in an orthotropic elastic cylinder with temperature dependent material properties. The effect of the various parameters of anisotropy and temperature dependency of material properties on the maximum stress was demonstrated graphically. Results indicate that for traction free boundary conditions, the effect of anisotropy of the coefficients of thermal expansion is more predominant on the maximum stress than any other parameters. Dissert. Abstr.

N80-13507 Cornell Univ., Ithaca, N. Y.
MICROSCOPIC MECHANISMS AND MECHANICS OF CRAZE GROWTH AND FRACTURE IN POLYSTYRENE Ph.D. Thesis
Bruce Douglas Lauterwasser 1979 229 p
Avail: Univ. Microfilms Order No. 7926994

A new technique was developed for investigating the micromechanical properties of crazes. The technique utilizes quantitative measurements of mass thickness scattering in the electron microscope to determine the volume fraction of fibrillated material within a craze. Craze surface displacement profiles, craze surface stress profiles, and true stress in the craze fibrils are then computed from the fibril volume fraction. Using the technique, isolated air crazes in thin films of polystyrene were studied and the craze parameters were calculated. Dissert. Abstr.

N80-13508 Northwestern Univ., Evanston, Ill.
INITIATION AND GROWTH OF FATIGUE MICROCRACKS AND STRAIN-CONTROLLED FATIGUE PROPERTIES IN STEEL ALLOYS: MICROSTRUCTURE AND MECHANICS Ph.D. Thesis
Yong-Ho Kim 1979 179 p
Avail: Univ. Microfilms Order No. 7927385

Initiation and growth of fatigue microcracks were studied in vacuum degassed 4140 steel in three conditions (as-quenched, tempered at 400 C and tempered at 650 C) and on several microstructures of Nb and V-alloyed high strength-low alloy steels. In as-quenched 4140 steels, fatigue cracks initiated at grain boundaries; however, in the 400 and 650 C tempered specimens, they initiated near prominent slip bands which gave extrusions and intrusions from the to and fro motion of dislocations. Similarly, in the high strength low alloy steels investigated, fatigue cracks were also observed to initiate and initially grow along the extrusions and intrusions. Fatigue crack initiation resistance increased with the cyclic yield stress in the low strain amplitude region. Dissert. Abstr.

N80-13509 Virginia Univ., Charlottesville.
DYNAMIC ANALYSIS OF COMPLEX MULTI-LEVEL FLEXIBLE ROTOR SYSTEMS Ph.D. Thesis
Dennis Fuk-Kuen Li 1979 354 p
Avail: Univ. Microfilms Order No. 7928010

Theories were developed for calculating the vibrations of complex multicomponent flexible rotor systems based on the transfer matrix method and the component mode method. The methods were compared for accuracy and computational efficiency in the linear dynamic analysis of a two-spool gas turbine engine. The dynamic stiffness and damping matrices of a rotating flexible shaft element were studied. Based on this result, the modal representation of a rotor including the effects of shear deformation, dry hysteresis, and viscous internal friction was developed. The ability of the component mode method to analyze a wide spectrum of machinery was demonstrated by a nonlinear transient simulation of the two-spool gas turbine engine equipped with a squeeze film damper bearing, and by an unbalance response analysis of the space shuttle oxygen turbopump in which the dynamics of the rotor and the housing in all six spatial directions were considered. Dissert. Abstr.

N80-13510 Kentucky Univ., Lexington.
HERTZIAN FRACTURE OF PYREX GLASS AND ALPHA QUARTZ Ph.D. Thesis
Yu-Lin Chen 1979 179 p
Avail: Univ. Microfilms Order No. 7927666

Abraded and as-received surfaces of Pyrex glass were impacted by steel balls of various radii at ambient conditions. The coefficient or restitution of the indentor was always less than one, indicating some kinetic energy was lost during impact. The ratio of energy loss due to crack formation to the initial kinetic energy was found to be less than four percent. Combining the energy losses and with cone crack surface area measurements, the surface fracture energy of Pyrex glass was obtained. The results on Pyrex glass were used to rationalize Hertzian fracture for anisotropic materials such as quartz. Two methods of loading were performed on carefully abraded or polished surfaces of different orientations using steel balls with various radii. It was found that Hertzian equations may be applied to the anisotropic brittle materials such as quartz, if they are modified with the anisotropic elastic constants. Also, with the assistance of stereographic projection, the Hertzian fracture test might be an extremely useful method to determine the cleavage planes of brittle crystals. Dissert. Abstr.

N80-13511# National Aeronautical Establishment, Ottawa (Ontario).
APPLICATION OF FINITE ELEMENT PROGRAMS APES, ASAS AND MARC TO LINEAR FRACTURE MECHANICS
J. J. Kacprzynski Mar. 1979 158 p
(LTR-ST-1118) Avail: NTIS HC A08/MF A01

The Atkins stress analysis system (ASAS), the axisymmetric/

planar elastic structure (APES), and the MARC programs are described and applied in studies of edge-cracked plates. Results are compared. The calculated examples and previous experience indicate that APES is the best of the compared programs for two-dimensional, plane or axisymmetric, linear fracture mechanics applications. The program is simple in applications and input preparation, and the cost of execution is very low. For more general fracture mechahics problems, such as three-dimensional linear crack or nonlinear elastic-plastic 2D or 3D, MARC is recommended. ASAS with the 11-node crack element (CK11) gives incorrect results; good accuracy is obtained with the 7-node symmetric crack element (SCK7). The cost of ASAS execution is prohibitive. A.R.H.

N80-13512*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ANALYSIS OF SURFACE CRACKS IN FINITE PLATES UNDER TENSION OR BENDING LOADS

J. C. Newman, Jr. and I. S. Raju (Joint Inst. for the Advancement of Flight Sciences, Hampton, Va.) Dec. 1979 46 p refs
(NASA-TP-1578; L-13053) Avail: NTIS HC A03/MF A01 CSCL 20K

Stress-intensity factors calculated with a three-dimensional, finite-element analysis for shallow and deep semielliptical surface cracks in finite elastic isotropic plates subjected to tension or bending loads are presented. A wide range of configuration parameters was investigated. The ratio of crack depth to plate thickness ranged from 0.2 to 0.8 and the ratio of crack depth to crack length ranged from 0.2 to 2.0. The effects of plate width on stress-intensity variations along the crack front was also investigated. A wide-range equation for stress-intensity factors along the crack front as a function of crack depth, crack length, plate thickness, and plate width was developed for tension and bending loads. The equation was used to predict patterns of surface-crack growth under tension or bending fatigue loads. A modified form of the equation was also used to correlate surface-crack fracture data for a brittle epoxy material within + or - 10 percent for a wide range of crack shapes and crack sizes. A.R.H.

N80-13513*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

COMPARISON TESTS AND EXPERIMENTAL COMPLIANCE CALIBRATION OF THE PROPOSED STANDARD ROUND COMPACT PLANE STRAIN FRACTURE TOUGHNESS SPECIMEN

D. M. Fisher and R. J. Buzzard Nov. 1979 21 p refs
(NASA-TM-81379; E-284) Avail: NTIS HC A02/MF A01 CSCL 20K

Standard round specimen fracture test results compared satisfactorily with results from standard rectangular compact specimens machined from the same material. The location of the loading pin holes was found to provide adequate strength in the load bearing region for plane strain fracture toughness testing. Excellent agreement was found between the stress intensity coefficient values obtained from compliance measurements and the analytic solution proposed for inclusion in the standard test method. Load displacement measurements were made using long armed displacement gages and hollow loading cylinders. Gage points registered on the loading hole surfaces through small holes in the walls of the loading cylinders. Author

N80-13514# Ames Lab., Iowa.

SURFACE-CRACK CHARACTERIZATION BY USE OF DYNAMIC PHOTOELASTIC SPECTROSCOPY

L. W. Zachary, C. P. Burger, L. W. Schmerr, and A. Singh 1979 19 p refs Presented at Spring Meeting of Soc. for Experimental Stress Analysis, San Francisco, 20 May 1979
(Contract W-7405-eng-82)
(IS-M-211; CONF-790503-2) Avail: NTIS HC A02/MF A01

A combination of ultrasonic surface wave photoelasticity and spectroscopic techniques used to quantitatively characterize surface flaws. R.E.S.

N80-13515# Los Alamos Scientific Lab., N. Mex.

FINITE ELEMENT LINEAR MODELS FOR SYMMETRICALLY LOADED THIN SHELLS OF REVOLUTION

William A. Cook 1979 25 p refs Presented at the 5th Intern. Sem. on Computational Aspects of the Finite Element Method, Berlin, 20-21 Aug. 1979
(Contract W-7405-eng-36)
(LA-UR-79-1321; CONF-790811-1) Avail: NTIS HC A02/MF A01

The models presented are: (1) a virtual work model that approximates equilibrium and uses two displacements and meridional rotation for the nodal variables; (2) a mixed model that approximates equilibrium and the meridional bending moment constitutive relation using two displacements and meridional bending moments for the nodal variables; (3) a virtual work model that approximates equilibrium using transverse shear deformation and uses two displacements and meridional rotation as the nodal variables; and (4) a virtual work model that approximates equilibrium using displacements and meridional rotation as nodal variables and includes transverse shear deformation and moments turning about the middle surface normal. Problems used to demonstrate the advantages of each model include a plate with a shear load, a cylindrical shell with a shear load, and a hemispherical shell with an applied moment. DOE

N80-13516# Cornell Univ., Ithaca, N. Y. Dept. of Theoretical and Applied Mechanics.

THERMOVISCOPLASTIC RESPONSE OF CYLINDRICAL STRUCTURES USING A STATE VARIABLE MODEL

S. Mukherjee Feb. 1979 28 p refs
(Contract EY-76-S-02-2733)
(COO-2733-19) Avail: NTIS HC A03/MF A01

A number of combined creep plasticity constitutive models with state variables, proposed to describe time dependent inelastic deformation of metals at elevated temperatures are reviewed. An efficient numerical solution of boundary value problems using constitutive models to predict the uniaxial responses of several metals and alloys to various types of loading histories is examined. Stresses and deformation in cylindrical structures subjected to time dependent axisymmetric mechanical and thermal loads are investigated. Several physically observed phenomena that cannot be simulated by traditional models are discussed. DOE

N80-13517# Brown Univ., Providence, R. I. Div. of Engineering.

ELASTIC PLASTIC ANALYSIS OF GROWING CRACKS

J. R. Rice, W. J. Drugan, and T. L. Sham May 1979 55 p refs Presented at the 12th Ann. Symp. on Fracture Mech., St. Louis, 21-23 May 1979
(Contract EY-76-S-02-3084)
(COO-3084-65; CONF-7905104-1) Avail: NTIS HC A04/MF A01

Results of an asymptotic analysis suggest the existence of a crack tip stress state similar to that of the classical Prandtl field, but containing a zone of elastic unloading between the centered fan region and the trailing constant stress plastic region. The model crack growth criterion requiring a critical rate of opening displacement at some fixed distance from the tip, is re-examined in light of the more accurate solution. Results suggest that the far field value versus crack length relation describing growth is dependent on the extent of yielding. It is suggested that this dependency might be small for highly ductile materials, provided that a similar triaxial constraint is maintained in all cases. DOE

N80-13518# Massachusetts Univ., Amherst. Dept. of Civil Engineering.

DYNAMIC PLASTIC BUCKLING OF SHELLS: A RECONSIDERATION OF THE VAUGHAN-FLORENCE ANALYSIS

G. Horvay, M. A. Veluswami, and F. D. Stockton Jan. 1979 22 p refs Presented at Intern. Conf. on Structural Mech. in Reactor Technol., Berlin, 13 Aug. 1979
(Contract EY-76-S-02-4122)
(CONF-790802-1) Avail: NTIS HC A02/MF A01

Extension of the Vaughan-Florence (VF) analysis to encompass axial variation of the impulse load revealed that the omega to the 2nd power term may not be neglected, because it constitutes only restraint on the motion that is caused by the departure from axial uniformity. This suggested reconsidering also the original VF analysis, for axial uniformity, with the omega to the 2nd power term retained. It was found that the maximum amplification is drastically reduced by retention of the omega to the 2nd

power term, by a factor close to 3 in VF's example, and is reached in a time about 25% below that given by VF. Various ramifications of the numerical integration scheme are also explored. It was found that about N = 20000 integration steps is optimal. DOE

N80-13519# Cornell Univ., Ithaca, N. Y. Dept. of Theoretical and Applied Mechanics.
EXPERIMENT AND PREDICTION IN THE BENDING OF A NICKEL BEAM AT 200 DEG C
J. A. Mautz and E. W. Hart May 1979 29 p refs
(Contract EY-76-S-02-2733)
(COO-2733-21) Avail: NTIS HC A03/MF A01

The bending response of a nickel prismatic beam under four point loading at 200 C is described. The specimens were subjected to histories of steady applied moment with a sequence of step changes both positive and negative. The measured results are compared with predictions based on Hart's constitutive equations. The experimental conditions and procedures are described. The experiment and the predictions are compared with prior studies. DOE

N80-13520# Department of Energy, Washington, D. C. Div. of Materials Sciences.
TIME-DEPENDENT FRACTURE OF MATERIALS AT ELEVATED TEMPERATURE
Stanley M. Wolf, ed. Jun. 1979 204 p refs Presented at Workshop on Time-Dependent Fracture of Mat., Germantown, Md., 15-16 Feb. 1979
(CONF-790236) Avail: NTIS HC A10/MF A01

Contents: (1) design considerations for high temperature components in fusion energy systems; (2) liquid-metal fast breeder reactor structural materials design considerations; (3) time-dependent fatigue phenomenology and life prediction; (4) creep mechanisms and constitutive relations in pure metals; (5) deformation mechanisms in cyclic creep and fatigue; (6) plastic creep flow processes in fracture at elevated temperatures; (7) deformation aspects of time dependent fracture; (8) report of s rbgroup on high temperature fracture; and (9) subgroup on engineering needs. DOE

N80-13521# General Atomic Co., San Diego, Calif.
RECOMMENDATION OF A TRIAXIAL FAILURE THEORY FOR GRAPHITE
P. Y. Tang May 1979 54 p refs
(Contracts EY-76-C-03-0167; DE-AT03-76ET-35300; Proj. 6400)
(GA-A-15333) Avail: NTIS HC A04/MF A01

Research was conducted on the application of triaxial failure theories to an anisotropic brittle solid. It was concluded that the strength tensor theory of Tsai and Wu appears most promising for high temperature gas cooled reactors (HTGR) structural graphites. The reduction of this theory to model the transversely isotropic nature of NTGR structural graphites is presented. The extensions to the ongoing biaxial stress experimental program, needed to provide the additional data required to verify this theory, are defined. DOE

N80-13522# Oak Ridge National Lab., Tenn.
FRACTOGRAPHIC STUDY OF A THICK WALL PRESSURE VESSEL FAILURE
D. A. Canonico, R. S. Crouse, and T. J. Henson 1979 20 p refs Presented at Intern. Metallographic Soc. Conf., Tamiment, Pa., 8 Jul. 1979
(Contract W-7405-eng-26)
(CONF-790730-2) Avail: NTIS HC A02/MF A01

The intermediate test vessel 1 fabricated of SA508, Class 2 Steel was tested to failure at 54 C. The gross failure appeared to be a brittle fracture although accompanied by a measured strain of 0.9%. Seven regions of the fracture were examined in detail and the observed surfaces were compared to Charpy V-notch (C/sub V/) specimens of SA508, Class 2 steel broken at temperatures above and below the ductile to brittle transition temperature. Three samples from the vessel were taken in the region around the fatigue notch and four from areas well removed from the notch. All these were carefully examined both optically and by scanning electron microscopy. It was established that early crack extension was by ductile mode until a large flaw approximately 500 mm long 83 wide was developed. At this point the vessel could no longer contain the internal pressure and final rupture was by brittle fracture. DOE

N80-13523# California Univ., Livermore. Lawrence Livermore Lab.
DYNAMIC EDGE DISLOCATION DISPLACEMENTS AND PEIERLS STRAINS IN A LINEAR ELASTIC STRIP Ph.D. Thesis
W. C. Moss Jun. 1979 136 p refs
(Contract W-7405-eng-48)
(UCRL-52787) Avail: NTIS HC A07/MF A01

A Fourier transform image method, used to obtain the displacement field of an edge dislocation in a finite width strip is described. Static, subsonic, transonic, and supersonic solutions are presented. Using the static solution, the Peierls strain is calculated, as a function of the length and the width of the strip. DOE

N80-13524# Oak Ridge National Lab., Tenn. Engineering Technology Div.
APPLICATION OF STATIC AND DYNAMIC CRACK ARREST THEORY TO THERMAL SHOCK EXPERIMENT TSE-4
R. D. Cheverton and S. K. Iskander 10 May 1979 31 p refs
(Contract W-7405-eng-26)
(NUREG-CR-0767; ORNL/NUREG-57) Avail: NTIS HC A03/MF A01

A dynamic method of analysis for a crack run-arrest event was applied to thermal shock experiment TSE-4, which was conducted on an A508 steel cylinder with a quench only heat treatment. A long axial flaw with an initial depth of 11 mm propagated in a single jump to a depth of 23 mm and arrested. The dynamic analysis indicated that dynamic effects for the 12 mm extension were essentially negligible; thus the statically calculated arrest toughness (K/sub Ia/) was a good approximation of K/sub Im/. This K/sub Im/ (K/sub Ia/) value was 24% less than K/sub Ic/ at the same temperature. DOE

N80-13525# Stanford Univ., Calif.
ACOUSTIC TECHNIQUES FOR MEASURING STRESS REGIONS IN MATERIALS Interim Report
G. S. Kino and J. H. Shaw Apr. 1979 75 p refs Sponsored by Elec. Power Res. Inst.
(EPRI Proj. 609-1)
(EPRI-NP-1043) Avail: NTIS HC A04/MF A01

A computer controlled system that produces quantitative two-dimensional images of stress contours in planar metal samples was constructed and used to study stress distributions due to both residual and externally applied stress in aluminum, steel, and copper specimens. The measurement is based on the dependence of the velocity of propagation of longitudinal sound waves, launched by a mechanically scanned single transducer into the deformed sample, on the state of stress in the material. Very favorable comparisons of theory with experiments were mape for stress distribution around a hole in a large, uniformly stressed plane sample, including detection of regions where plastic yield has taken place. Detailed stress maps were made of the very inhomogeneous regions around edge cracks, showing excellent agreement with theoretical expectations. Similar very encouraging results were obtained from mapping residual stress in extruded aluminum and copper samples. DOE

N80-13526# Admiralty Marine Technology Establishment, Teddington (England).
THE EFFECT OF ANALYSIS BANDWIDTH ON THE ACCURACY OF MEASUREMENTS AND PREDICTIONS OF SINGLE DEGREE OF FREEDOM SYSTEM BEHAVIOR
A. W. Walker London HMSO Mar. 1979 25 p refs
(AMTE(N)-TM-79401; BR67702) Avail: NTIS HC A02/MF A01

The accuracy of measurements or predictions of the frequency response of a single degree of freedom system depends on the frequency resolution of the analysis technique. If the ratio of analysis bandwidth to the 3 dB bandwidth of the resonance is too great, negative bias errors occur at resonance in estimates of both power spectral levels and transfer function amplitudes. These errors, which were calculated numerically, are presented and compared with appropriate experimental data. Author (ESA)

N80-13527# Royal Aircraft Establishment, Farnborough (England).
THE IMPLEMENTATION AND PRACTICAL VERIFICATION OF A SUPERPOSITION METHOD FOR THE SOLUTION OF ELASTIC CRACK PROBLEMS
P. Bartholomew London HMSO Nov. 1978 20 p refs Presented at Inter. Conf. on Numerical Methods in Fracture Mech., Swansea, Engl., 9-13 Jan. 1978
(RAE-TM-Struct-940; BR66435) Avail: NTIS HC A02/MF A01

A superposition method which provides a practical and efficient way for solving linear elastic crack problems is demonstrated. The method approximates the linear elasticity solution over a substructure containing the crack tip by the superposition of appropriate singular stress fields and a relatively coarse finite element mesh. A hybrid variational principle is employed to ensure displacement compatibility between this substructure and adjoining ones employing finite elements alone. A key feature of the method is that it may be implemented by adding routines to existing finite element packages. The particular implementation discussed here is intended for use in the aircraft industry. Author (ESA)

N80-13528# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Strength of Materials and Solid Mechanics.
A TESTING MACHINE WHICH FULFILLS FIXED BOUNDARY DISPLACEMENT CONDITIONS
Lars Dahlberg 1978 17 p refs Sponsored by Axel och Margaret Axson Johnsons Stiftelse foer Allmaennyttiga Aendmaal
(TRITA-HFL-0022) Avail: NTIS HC A02/MF A01

A load test machine for the study of the limit of dynamic linear fracture mechanics with respect to nonelastic deformations in a body is described. The design and construction of the testing apparatus is discussed. The machine is intended for use with strip specimens. The theoretical characteristics of this type of specimen (an infinite elastic strip with a semi-infinite crack) are reviewed. Numerical calculations are compared to test results. It is shown that the energy flow to the crack tip is very little affected by the finite length of the strip specimen provided the crack tip is not too close to a boundary. Experimental studies of rapidly propagating cracks in steels, aluminum, brass, and polymers are cited. The machine can also be adapted to study creep and stress corrosion crack growth. Author (ESA)

N80-13299 Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
DYNAMIC SNAP-THROUGH OF SHALLOW ARCHES AND SPHERICAL CAPS
S. M. Holzer *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 3 Mar. 1979 p 3-6 refs (For primary document see N80-13298 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington D. C. 20375 CSCL 20/11

N80-13305 Loughborough Univ. of Technology (England).
WIND EXCITED BEHAVIOR OF STRUCTURES, 2
D. J. Johns *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 4 Apr. 1979 p 17-29 refs (For primary document see N80-13302 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

N80-13308 Air Force Materials Lab., Wright-Patterson AFB, Ohio.
HIGH TEMPERATURE DAMPING OF DYNAMIC SYSTEMS
D. I. G. Jones *In* SVIC Shock and Vibration Digest, Vol. 11, No. 5 May 1979 p 13-18 refs (For primary document see N80-13306 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

N80-13309 Chubu Inst. of Tech., Kasugai (Japan).
REDUCTION METHODS FOR PROBLEMS OF VIBRATION OF ORTHOTROPIC PLATES. PART 1: EXACT METHODS
T. Sakata *In* SVIC Shock and Vibration Digest, Vol. 11, No. 5 May 1979 p 19-26 refs (For primary document see N80-13306 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

N80-13312 General Dynamics Corp., Groton, Conn. General Boat Div.
BEHAVIOR OF ELASTOMETRIC MATERIALS UNDER DYNAMIC LOADS, 2
E. C. Hobaica *In* SVIC Shock and Vibration Digest, Vol. 11, No. 7 Jul. 1979 p 11-18 refs (For primary document see N80-13310 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/11

N80-13313 Southwest Research Inst., San Antonio, Tex.
APPROXIMATE TECHNIQUES FOR PLASTIC DEFORMATION OF STRUCTURES UNDER IMPULSIVE LOADING, 2
W. E. Bakerm *In* SVIC Shock and Vibration Digest, Vol. 11, No. 7 Jul. 1979 p 19-24 refs (For primary document see N80-13310 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20735 CSCL 20/11

42 GEOSCIENCES (GENERAL)

N80-13529# European Space Agency, Paris (France).
MAGNETOSPHERIC BOUNDARY LAYERS
Bruce Battrick, ed. and Jacqui Mort, ed. Aug. 1979 411 p refs Proc. of lectures presented at ESA/Sydney Chapman Intern. Conf., Albach, Austria, 11-15 Jun. 1979; sponsored by Am. Geophys. Union, European Geophys. Soc., Austrian Solar and Space Agency and Max-Planck Inst. fuer Extraterrest.
(ESA-SP-148) Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Magnetospheric boundary layers as observed around the Earth as well as around other various astronomical bodies are considered. Theoretical discussions along with reports of recent satellite measurements are given. Main topics include the structure of magnetopause and boundary layers, the extension of boundary layers to lower altitudes, other magnetospheres than the Earth's, accreting neutron stars, transfer mechanisms, and the equilibrium structure of the magnetopause. For individual titles, see N80-13530 through N80-13581.

N80-13530*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GLOBAL ASPECTS OF THE EARTH'S MAGNETOPAUSE **c46**
D. H. Fairfield *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 5-13 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

Measurable characteristics of the magnetopause are discussed. The Earth's magnetopause is a thin magnetic discontinuity separating the shocked, magnetized plasma of the solar wind from a more tenuous plasma contained by the geomagnetic field. This external magnetosheath plasma flows around the magnetosphere with characteristics that are in approximate agreement with gas dynamic theory. The interplanetary magnetic field carried by this plasma becomes draped over the magnetosphere and its orientation relative to the local geomagnetic field determines the local magnetopause current. Solar wind pressure and interplanetary field direction control the geocentric distance to the magnetopause with high pressures and southware fields moving the equatorial magnetopause to a more earthward location. Evidence suggests that the magnetopause is Kelvin-Helmholtz unstable and surface waves are propagating toward the magnetotail. Author (ESA)

N80-13531# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
AN ELECTRIC-CURRENT MODEL OF THE MAGNETOSPHERE **c46**
H. Alfven *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 15-21 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

A translation of the traditional field description of the magnetosphere into a particle (electric current) description is offered. Focus is on the energy transfer from the solar wind. The solar wind flow through the magnetic field acts as an electric generator. Its power is transferred to the magnetosphere through four main circuits. These are the magnetopause circuit, the solar wind/auroral circuit, the tail circuit, and the front circuit. A fifth circuit, the substorm circuit, is also very often energized. When the tail circuit flares, the current is partly redirected over the auroral zone, flowing in what is called the 'substorm circuit'.

Author (ESA)

N80-13532# Max-Planck-Institut fuer Extraterrestrische Physik, Garching (West Germany).

PLASMA STRUCTURE OF THE MAGNETOPAUSE AND BOUNDARY LAYER **c46**

G. Paschmann *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 25-36 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The large amount of data on the plasma properties in the magnetospheric boundary layers is reviewed. Starting with the global aspects of the layers, plasma parameter profiles in the various regions are compared and recent evidence for rapid temporal variations is presented. The boundary layer flow is taken up separately as well as the observed distribution functions. The plasma structure of the magnetopause is considered with emphasis on ISEE results. The observations are summarized in the framework of current ideas on plasma entry and transport.

Author (ESA)

N80-13533# Max-Planck-Institut fuer Extraterrestrische Physik, Garching (West Germany).

EXTERNAL PLASMA FLOW **c46**

N. Sckopke *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 37-42 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The magnetosheath plasma properties observed in the subsonic region and near the polar cusps, i.e. in regions where the flow deviates from the predictions of the axisymmetric gasdynamic model, are discussed. Stagnating flow, depletion, and turbulence in the subsonic region are dealt with. Plasma in the exterior cusp is then described. Observations from HEOS-2 are used to support the discussion. Author (ESA)

N80-13534*# California Univ., Berkeley. Inst. of Geophysics and Planetary Physics.

ISEE-1 AND 2 MAGNETOMETER OBSERVATIONS OF THE MAGNETOPAUSE **c46**

R. C. Elphic and C. T. Russell *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 43-50 refs (For primary document see N80-13529 04-42)

(Contract NAS5-20064)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

The ISEE 1 and 2 satellites were launched on October 22, 1977 into nearly identical highly elliptical orbits with an apogee of 23 Earth radii, carrying sophisticated field, particle, and plasma wave instrumentation. The unique feature of the mission is the variable separation of the two spacecraft in nearly identical orbits, permitting studies of the velocities of the boundaries relative to the satellites and making it possible to deduce the thickness of these boundaries. The ISEE measurements show that the magnetopause motion is rapid and irregular, and that thicknesses from 500 to 1600 km are observed, depending on magnetosheath field orientation. These data suggest that reconnection often occurs in discrete increments and enough flux is transported during these events to support substorm activity. Author (ESA)

N80-13535# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.

QUASISTATIC ELECTRIC FIELDS OBSERVED DURING A NUMBER OF MAGNETOPAUSE CROSSINGS BY ISEE-1 **c46**

U. V. Fahleson, C. G. Faelthammar, P. A. Lindqvist, F. S. Mozer (Calif. Univ., Berkeley), R. B. Torbert (Calif. Univ., Berkeley), A. Gonfalone (ESTEC, Noordwijk, Netherlands), and A. Pedersen (ESTEC, Noordwijk, Netherlands) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 51-65 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Quasi-static electric field measurements with spherical double probes were carried out during magnetopause crossings on a number of ISEE 1 orbits. These measurements were made at magnetic latitudes below 30 deg and for different local times as well as for different magnetosheath magnetic field directions. The power dissipation at the magnetopause was estimated from measurements of the electric field and from the current, inferred from the magnetometer data. The power dissipation is found to be largest, of the order 200 micro W/sq m, near the frontside for a southward magnetic field in the magnetosheath and a somewhat compressed magnetosphere. No power dissipation is observed on the frontside for a northward magnetic field in the magnetosheath. On the dawn side, magnetopause power dissipation is also observed to be positive for a southward magnetosheath magnetic field. An approximate magnetosheath and magnetosphere convection is derived and it is also found that a component towards the magnetopause on both sides which is the expected signature for a reconnection process exists.

Author (ESA)

N80-13536# European Space Technology Center, Noordwijk (Netherlands). Space Science Dept.

MAGNETOPAUSE ELECTRIC AND MAGNETIC FIELD SIGNATURES AT TIMES OF MAGNETOSPHERIC COMPRESSIONS **c46**

R. Grard, A. Pedersen, F. Mariani (CNR, Frascati, Italy), and C. Signorini (CNR, Frascati, Italy) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 67-72 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The magnetopause was observed near the geostationary orbit on the GEOS 2 satellite. Quasi-static electric and magnetic field observations provided information for different local times; one event in particular, on August 28, 1978, provided a unique opportunity when GEOS 2 travelled near the magnetopause for several hours. The electric field has a component in the direction of the magnetopause current during most crossings; the resulting power dissipation is of the order of 100 W/km sq. This implies that field line reconnection must be effective during this time. The derived electric field drift is found to have a component towards the magnetopause on the magnetospheric and magnetosheath sides. The electric field is probably due to the existence of a polarization layer generated by the penetration of magnetosheath ions into the magnetosphere. Author (ESA)

N80-13537# European Space Technology Center, Noordwijk (Netherlands). Space Science Dept.

RADIAL DISCONTINUITIES IN LOW-ENERGY MAGNETOSPHERIC PLASMA OBSERVED ON GEOS-1 **c46**

K. Knott, R. Grard, and A. Pedersen *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 75-79 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The GEOS 1 orbit is ideally suited to studying the low latitude magnetosphere between three and seven Earth radii at all local times. The long-boom electric field sensors operated continuously in a negative current bias mode and therefore, provided plasma density as a by-product. These data were evaluated in terms of radial density gradients. A marked density reduction from 100 to 50/cu cm is normally observed around four Earth radii at all local times. In the local time sector near 16:00, the average density is high, often close to 50/cu cm, all the way out to seven Earth radii. At other local times, the density beyond four Earth radii falls rapidly to values in the range 5 to 20/cu cm and thereafter decreases only slightly with radial distance. A second decrease to less than 5/cu cm if often recorded as well, primarily in the dusk-midnight sector. This boundary coincides with previous observations of the inner edge of the plasma sheet and also agrees with the trend shown by the particle experiments on GEOS 1. Author (ESA)

N80-13538# Kiruna Geophysical Inst. (Sweden).

FIRST OBSERVATIONS OF A HEATED PLASMA COMPO-

NENT IN THE PLASMA MANTLE **c46**

B. Hultqvist, R. Lundin, I. Sandahl, N. Pissarenko (Acad. of Sci., Moscow), and A. Zacharov (Acad. of Sci., Moscow) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 83-89 refs Sponsored in part by Swedish Board for Space Activities (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

A heated plasma component was found in the plasma mantle close to the magnetopause by means of the Swedish-Soviet collaborative experiment PROMICS onboard the highly eccentric orbit satellite Prognoz 7. Both electrons and ions are heated. The heated plasma is at least partly of ionospheric origin. The total amount of energy loss through the tailward flow of the heated plasma is estimated to be of the order of 100 giga W. Author (ESA)

N80-13539# Kiruna Geophysical Inst. (Sweden).

FIRST OBSERVATIONS OF THE HOT ION COMPOSITION IN THE HIGH ALTITUDE MAGNETOSPHERIC BOUNDARY LAYER BY MEANS OF PROGNOZ-7 **c46**

R. Lundin, I. Sandahl, B. Hultqvist, A. Galeev (Acad. of Sci., Moscow), O. Likhin (Acad. of Sci., Moscow), A. Omelchenko (Acad. of Sci., Moscow), N. Pissarenko (Acad. of Sci., Moscow), O. Vaisberg (Acad. of Sci., Moscow), and A. Zacharov (Acad. of Sci., Moscow) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 91-96 refs Sponsored in part by Swedish Board for Space Activities (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Plasma measurements were carried out during high latitude magnetopause crossing onboard the Prognoz 7 satellite by means of a plasma analyzer, SCS, and the PROMICS experiment which contains mass spectrometers besides electron and ion energy spectrometers. Data from ion measurements in the energy and mass range 0.2 to 17 keV and 1 to 20 AMU, respectively, made during the first inbound magnetopause crossing of Prognoz 7, demonstrate that keV O ions (of ionospheric origin) exist in the high latitude plasma mantle with fluxes amounting to a sizable fraction of the proton flux for the same energy interval in some regions. The energy spectrum of the O ions was harder than that of the protons in the mantle. The O ion spectrum in the keV range was also harder in the outer mantle than in the inner. The He/H ion ratio was lower just inside the magnetopause than just outside it. Some physical implications of the observations are discussed. Author (ESA)

N80-13540# Aerospace Corp., Los Angeles, Calif. Space Sciences Lab.

OBSERVATIONS OF ION AND ELECTRON DISTRIBUTIONS DURING THE JULY 29 AND JULY 30, 1977 STORM PERIOD **c46**

J. F. Fennell, P. F. Mizera, and D. R. Croley, Jr. *In* ESA Magnetospheric Boundary Layers 1979 p 97-111 refs (For primary document see N80-13529 04-42)

(Contract F04701-78-C-0079; Grant NSF ATM-78-03600)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Low energy ion and electron observations taken during the July 29-30, 1977 storm period aboard the S3-3 satellite are presented and discussed. The particle precipitation was very intense, especially on July 29. Enhanced fluxes of low energy particles were observed from the auroral regions down to the plasmasphere. There were observations of downward flowing ions with peaks near 800 eV in the near earth plasma sheet. There is evidence that heavy ions dominate the ring current at low energies. Examples of electron and ion accelerations along the magnetic field lines are presented. The July 29 auroral fluxes do not show broad inverted V structures. Such structures were observed on July 30 and examples of two such structures are discussed. A summary of the particle boundaries for this period is also presented. Author (ESA)

N80-13541# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).

MAGNETIC PULSATIONS OBSERVED ON BOARD GEOS-2 IN THE ULF RANGE DURING MULTIPLE MAGNETOPAUSE CROSSINGS **c46**

S. Perraut, R. Gendrin, P. Robert, and A. Roux *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 113-122 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

During periods of large magnetic activity, GEOS 2 experienced multiple magnetopause crossings. The characteristics of the ULF waves which were detected during two of these crossings, the 28th of August and the 29th of September 1978, are described. For both events, the interplanetary magnetic field had a strong southward component. The most striking phenomenon which was observed is the existence of very strong turbulence, the intensity of which, integrated between 0.3 and 10 Hz, reaches values as high as 10 gamma. This turbulence is restricted to a small transition region (500 km) at the border of the magnetopause, within the magnetosheath. Its role with respect to the reconnection phenomenon is discussed. Further in the magnetosheath, the ULF noise has a much lower intensity which seems to be attributable to the presence of He ions. Author (ESA)

N80-13542# Danish Space Research Inst., Lyngby.

CRITICAL LEVEL BEHAVIOR OF ION-CYCLOTRON WAVES AT MAGNETOSPHERIC BOUNDARY LAYERS **c46**

J. F. McKenzie *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 123-127 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The propagation characteristics of ion-cyclotron waves in a magnetized plasma in which the plasma density varies in a direction perpendicular to that of the ambient magnetic field is investigated. It is shown that such waves are trapped between a reflecting layer and a critical layer. Near the latter level, the wave field becomes large and across this level the Poynting flux jumps discontinuously from one constant value to another, with the implication that the plasma absorbs wave energy in the vicinity of a critical level. It is demonstrated that critical level behavior and field line resonance are related, but inversely, both arising from the same singularity in the governing wave equation. The relevance of critical level behavior to ion-cyclotron waves propagating in the vicinity of the plasmapause and magnetopause is discussed. Author (ESA)

N80-13543# Sheffield Univ. (England). Dept. of Physics.

A WAVE-PARTICLE-WAVE INTERACTION OBSERVED ON GEOS-2 **c46**

T. R. Kaiser *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 129-130 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Simultaneous pairs of emission bands were observed on GEOS 2; one below and one above half the electron gyrofrequency. It is suggested that the lower band is a whistler mode wave of frequency omega with a longitudinal component of the E-field. Longitudinally trapped particles (traveling at the wave phase velocity) then produce backward Doppler shifted cyclotron radiation which accounts for the upper emission band. Author (ESA)

N80-13544*# California Inst. of Tech., Pasadena.

ENERGETIC ELECTRON BURSTS IN THE MAGNETOPAUSE ELECTRON LAYER AND IN INTERPLANETARY SPACE **c46**

J. W. Bieber and S. C. Stone *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 131-135 refs (For primary document see N80-13529 04-42)

(Contract NAS5-11066; Grant NGR-05-002-160)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

The magnetopause electron layer in the distant magnetotail is an annular region encircling the magnetopause in which bursts of tailward-streaming energetic ($E > 200$ keV) electrons are almost continuously present. Sunward-streaming electron bursts with time scales and energy spectral indices similar to those of layer bursts are sometimes observed in interplanetary space upstream of the Earth. Evidence is presented to show that the layer bursts and the interplanetary bursts have a common source. With the aid of a new coordinate system, geocentric interplanetary medium coordinates, appropriate for describing the access of energetic charged particles in the inner magnetosheath to a spacecraft located in interplanetary space, it is shown that the interplanetary bursts occur predominantly on the sunward extension of the field lines associated with the magnetopause electron layer. Author (ESA)

N80-13545# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).

ION AND ELECTRON LAYERS AT THE MAGNETOPAUSE: ISEE-2 **c46**

P. W. Daly, E. Keppler, and D. J. Williams (NOAA Space Environ. Lab.) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 137-141 refs Co-sponsored by Max-Planck Ges. (For primary document see N80-13529 04-42)

(Contract BMFT-RV-14-B30/73)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The medium energy particle spectrometer on board ISEE 2 was used to study dayside magnetopause crossings between local times noon to 0800. Evidence was found for a layer of ions ($E > 20$ keV) just outside the magnetosphere, with a thickness varying from 0.05 to 0.09 Earth radii, increasing from the nose to the flanks. The ion flow is along the boundary, at pitch angles of 180 deg to the magnetic field. The total rate of energy flow, when extrapolated around the entire magnetosphere is of the order of 10 peta ergs/sec. The electron layers are coincident with the ions, but are less intense. Their flow is sometimes the same as that of the ions, otherwise it tends to be isotropic. Author (ESA)

N80-13546# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.

PARTICLE AND FIELD CHARACTERISTICS OF THE DAYSIDE MAGNETOPAUSE ENERGETIC ELECTRON LAYER **c46**

Ching-I. Meng (Iowa Univ., Iowa City), L. A. Frank (Iowa Univ., Iowa City), and K. L. Ackerson *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 143-148 refs (For primary document see N80-13529 04-42)

(Contract NSF ATM-75-02621)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The presence of a layer of energetic electrons in the inner magnetosheath region is discussed. The particle and field characteristics in this region were studied by using data from three experiments aboard the IMP-5 satellite, namely, the University of California (Berkeley) medium energy particle detectors, the University of Iowa plasma detector (Lepedea), and the NASA Goddard magnetometer. Based on observations over the dayside high latitude magnetopause region, it is found that the enhanced energetic electron layer in the inner magnetosheath is only one of several manifestations of this layer located near the magnetopause. Intense magnetic noise, enhanced plasma number and energy densities, and a decrease of the magnetic field magnitude are also present in this layer. Author (ESA)

N80-13547*# Washington Univ., Seattle.

PARTICLE BOUNDARY STRUCTURES AT THE MAGNETOPAUSE AND THE PLASMA SHEET **c46**

G. K. Parks, C. S. Lin (California Univ., Berkeley), K. A. Anderson (Paul Sabatier Univ., Toulouse), R. P. Lin (California Univ., Los Angeles), H. Reme (John Hopkins Univ., Baltimore), F. Coroniti (Ecole Polytech., Paris), C. Meng, and R. Pellat *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 151-156 refs (For primary document see N80-13529 04-42)

(Contracts NAS5-20079; CNES-212)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

There are three classes of particle events in the vicinity of the magnetopause: a layer of particles right at the magnetopause which we identify with the boundary layer particles; spikes of particles just ahead of the magnetopause; and, sometimes, magnetosheath-like ions appearing inside the magnetosphere, the inclusion events. The energy spectra of these three classes of events are very similar, indicating a common particle source. The presence of a particle layer at the outer boundary of the plasma sheet is shown. This layer has typical dimensions of a few thousand km at 20 Earth radii. A typical velocity is a few tens of km/sec. These velocities and dimensions projected to ionospheric heights resemble those of visual auroras and suggest that aurorally associated particle phenomena are being detected. Author (ESA)

N80-13548# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).

VARIATIONS OF ELECTRON AND ION DISTRIBUTIONS DURING DAYSIDE MAGNETOPAUSE CROSSINGS OF GEOS-2 **c46**

A. Korth, G. Kremser, B. Wilken, E. Amata (Lab. Plasma Spazio), and M. Candidi (Lab. Plasma Spazio) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 157-159 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The geostationary satellite GEOS 2 crossed the dayside magnetopause several times on August 28, 1978. The particle spectrometer provided observations of the distributions of electrons and ions with energies from 20 to 300 keV. Magnetometer data were used to determine the location of GEOS 2 relative to the magnetopause. The observed pitch angle distributions near the magnetopause were strongly asymmetric with respect to 90 deg and showed a strong field aligned flow along magnetosheath field lines. Author (ESA)

N80-13549# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).

MULTIPLE-SATELLITE OBSERVATIONS OF LARGE SCALE TRAPPING BOUNDARY MOTIONS **c46**

B. Wilken, A. Korth, G. Kremser, and Th. A. Fritz (NOAA Space Environment Lab.) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 161-163 refs (For primary document see N80-13529 04-42)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Large rapid decreases in the energetic particle flux followed by even more rapid increases are frequently observed in and near geosynchronous altitude during geomagnetic storms. Correlated measurements from GEOS 1 and ATS 6 are used to analyze a flux drop-out observed during the disturbed period on December 11, 1977. The motion of the gradients in the energetic particle distributuions are determined from azimuthal anisotropies generated at the position of GEOS 1 at 26 deg geomagnetic latitude. These measurements are compared with observations in the geosynchronous orbit at approximately the same local time. Author (ESA)

N80-13550*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.

LOW-ALTITUDE SIGNATURES OF THE BOUNDARY LAYERS **c46**

P. H. Reiff *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 167-173 refs (For primary document see N80-13529 04-42)

(Grants NGR-44-006-012; NSG-5286; NSF ATM-77-12619)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

Low altitude measurements reveal two distinct types of dayside boundary-layer plasmas. The first type is characterized by a proton distribution whose average energy decreases with increasing latitude and generally shows cool, unaccelerated electron fluxes. This type is observed only near noon and is correlated with southward interplanetary magnetic field (IMF). The second type is characterized by a 'V' signature in which the proton average energy first decreases then briefly increases as a function of latitude. The electron distribution in the latter case is hotter and often shows evidence of small scale acceleration regions. This type can be seen at all local times in the dayside and at noon is correlated with a northward IMF. It is suggested that the type 1 plasma is the low altitude signature of the plasma mantle and the type 2 plasma is the low altitude signature of the low latitude boundary layer. Author (ESA)

N80-13551*# Texas Univ., Dallas. Center for Space Sciences.

IONOSPHERIC CONVECTION AT HIGH LATITUDES **c46**

R. A. Heelis *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 175-181 refs (For primary document see N80-13529 04-42)

(Contract NAS5-11407; Grant NGR-44-004-120)

Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

The characteristics of the high latitude ionospheric convection pattern that results from the transmission of electric fields from the magnetosphere was examined by gathering data from ground based and in situ measurements. The Atmosphere Explorer C satellite measurements of the motion of the high latitude ionosphere show that the dayside and nightside convection patterns are influenced by the interplanetary magnetic field and that the relationships between the energetic particle precipitation

and the convection reversal boundaries are very complex. The existence of a magnetospheric boundary layer is consistent with the satellite observations, but its relationship to open and closed field lines cannot be determined. Author (ESA)

N80-13552# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).
STARE IONOSPHERIC ELECTRON FLOWS DURING THE AUGUST 28, 1978 GEOS-2 MAGNETOPAUSE CROSSING **c46**
G. J. Sofko, R. A. Greenwald, A. Korth, and G. Kremser *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 183-185 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Selected GEOS 2 particle intensities (ions > 27 keV, electrons > 22 keV) and asymmetric pitch angle distributions are compared with STARE ionospheric electron flow patterns and scattering structures just after the August 28, 1978 magnetopause crossing at 0530 UT. The combined results indicate the presence at the magnetopause of eastward moving localized merging regions through which magnetopause plasma is expelled into the magnetosheath. Author (ESA)

N80-13553# Lockheed Missiles and Space Co., Palo Alto, Calif.
ION COMPOSITION IN THE DAYSIDE CUSP: INJECTION OF IONOSPHERIC IONS INTO THE HIGH LATITUDE BOUNDARY LAYER **c46**
E. G. Shelley *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 187-192 refs Sponsored in cooperation with Office of Naval Res. and NSF (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Ion composition measurements of the primary magnetosheath ions (H and He) in the lower altitude dayside cusp provide information on the processes acting on the plasma between the solar wind source and the point of observation. They suggest that at times the processes are purely adiabatic while at other times parallel electrostatic fields are implied. Measurements of ionospheric constituents (specifically O) reveal that these ions are continuously being accelerated to energies of the order of keV within the lower altitude cusp region and are being injected along with the plasma of magnetosheath origin into the high latitude boundary layers. Author (ESA)

N80-13554# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
BIRKELAND CURRENTS AND THE INTERPLANETARY MAGNETIC FIELD **c46**
T. A. Potemra and N. A. Saflekos (Boston Coll.) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 193-198 refs Sponsored in cooperation with Office of Naval Res. and NSF (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Magnetic field measurements acquired at low altitude with the ISIS 2 and TRIAD spacecraft confirm the close connection between the orientation and amplitude of the interplanetary magnetic field (IMF) and the spatial location, flow direction, and amplitude of Birkeland currents in the high latitude dayside region usually referred to as the cusp. These relationships demonstrate that the Birkeland currents are an important element in the electric circuit responsible for the close connection of surface magnetic disturbances in the polar regions with the orientation of the IMF. These same relationships support previous suggestions for magnetic merging in regions of anti-parallel IMF and geomagnetic field lines on the dayside boundary of the magnetosphere. Author (ESA)

N80-13555# Boston Coll., Chestnut Hill, Mass. Dept. of Physics.
DAYSIDE AURORA AND SUBSTORM CURRENT SYSTEMS **c46**
R. H. Eather, S. B. Mende (Lockheed Res. Lab., Palo Alto, Calif.), and E. J. Weber (Air Force Geophysics Lab.) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 199-206 refs (For primary document see N80-13529 04-42)
(Contract NSF C-659)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Dayside cusp auroral signatures from South Pole keograms allow an investigation of the dependence of cusp movements on substorm activity and interplanetary magnetic field direction. Erosion of dayside field is not a direct result of southward turning, but is closely related to substorm timing and intensity. The dayside field reconfigurations result from increases in near-tail magnetopause currents, which connect through the nightside electrojet. This implies a substorm mechanism involving increased energy extraction from the solar wind, rather than a relaxation process of release of internally stored energy. Author (ESA)

N80-13556# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
COMMENTS ON THE LOW-ALTITUDE OPTICAL SIGNATURES OF MAGNETOSPHERIC BOUNDARY LAYERS **c46**
M. M. Shepherd and G. G. Shepherd *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 207-208 (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The production efficiency for 6300 A emission by energetic electrons was studied with the ISIS 2 spacecraft by comparing the optical emissions with the low energy electron fluxes. It is shown that the production efficiency falls sharply above about 300 eV, so that this emission is primarily produced by electrons with lower energies than that. Maps from ISIS 2 of the 6300 A emission may, therefore, be interpreted as fluxes of electrons with energies less than 300 eV. Author (ESA)

N80-13557# Cornell Univ., Ithaca, N. Y. School of Electrical Engineering.
LOW FREQUENCY WAVES AND IRREGULARITIES IN THE LOW ALTITUDE BOUNDARY LAYER **c46**
P. Kintner and M. Temerin (California Univ., Berkeley) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 209-216 refs (For primary document see N80-13529 04-42)
(Contract N00014-75-C-0780)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Within the low altitude boundary layer a variety of plasma wave processes occur. Two processes, high latitude turbulence and electrostatic hydrogen cyclotron (EHC) waves are reviewed. High altitude turbulence appears to be a fluid process whose behavior can be explained in part by nonlinear two dimensional fluid turbulence. In laboratory plasmas, EHC waves are produced by a resonant interaction with either ion beams or drifting electrons. There exists evidence that drifting electrons and ion beams are sources of free energy for the EHC wave observed by S3-3. There also exists evidence that EHC waves are a source of energy for ion conics. Author (ESA)

N80-13558*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
JUPITER'S MAGNETOPAUSE **c91**
E. J. Smith *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 221-224 refs (For primary document see N80-13529 04-42)
(Contract NAS7-100)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 03B

Some of the major conclusions regarding the magnetopause of Jupiter, based on Pioneer and Voyager observations, are discussed. Topics include the overall shape of the magnetosphere, the variability in the location of the magnetopause with changes in the solar wind, intrinsic magnetospheric motions, the character of the field and plasma just inside the magnetopause and evidence of magnetic merging. Author (ESA)

N80-13559*# Rice Univ., Houston, Tex.
THE JOVIAN BOUNDARY LAYER AS FORMED BY MAGNETIC-ANOMALY EFFECTS **c91**
A. J. Dessler *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 225-226 refs (For primary document see N80-13529 04-42)
(Grant NGR-44-006-137)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 03B

A model is presented in which a plasma boundary layer of Jupiter is formed from plasma of internal origin. It is proposed that, unlike the Earth's boundary layer, which is thought to consist principally of solar wind plasma, Jupiter's boundary layer consists principally of sulphur and oxygen from the Io plasma torus, plus a small component of hydrogen from Jupiter's ionosphere. Fresh

plasma is supplied to the boundary layer once each planetary rotation period by a convection pattern that rotates with Jupiter. Author (ESA)

N80-13560*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
EARTH AND JUPITER: COMPARISON OF MAGNETOPAUSE STRUCTURE c91
P. H. Reiff and C. W. Hill *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 227-228 refs (For primary document see N80-13529 04-42)
(Grants NGR-14-006-137; NSF ATM-78-21767)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 03B

Using published data from the Jovian magnetopause crossings of Pioneers 10 and 11, the apparent crossing times as determined from the solar wind plasma detector and from the vector magnetometer are comapred. There were 13 published crossings for which both plasma and magnetic-field signatures were clearly defined. The occurrence distribution of these 13 crossings with respect to the relative timing of plasma and field signatures is shown. Results indicate that Jupiter's magnetopause is more turbulent than the Earth's possibly as the result of the large velocity shear between the magnetosheath and the partially corotating Jovian plasma. However, it is noted that the data set considered is too small to justify a definitive interpretation. Author (ESA)

N80-13561*# California Univ., Los Angeles.
THE SOLAR WIND INTERACTION WITH VENUS c92
C. T. Russell, R. C. Elphic, and J. A. Slavin *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 231-239 refs (For primary document see N80-13529 04-42)
(Contract NAS2-9491)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 03B

The Pioneer Venus orbiter reveals that Venus has a well developed bow shock like the Earth's but on that is significantly weaker than the Earth's shock. The location of the bow shock is highly variable, more so than would have been expected for an obstacle of essentially fixed size. The altitude of the ionopause is also highly variable in response to changes in the solar wind. In the ionosphere, the field is often low. However, on some orbits, very large fields are seen as low as 150 km, and on most dayside orbits, thin magnetic structures of flux ropes are observed. At night, large fields are often observed which vary from orbit to orbit. Venus has a much smaller intrinsic magnetic moment than expected from scaling the terrestrial moment. Author (ESA)

N80-13562# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany).
INSTABILITIES OF ACCRETION DISK: MAGNETOSPHERE INTERFACES c90
U. Anzer and G. Boerner *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 259-261 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Configurations which consist of a Keplerian accretion disk and a magnetosphere with solid rotation are investigated. Because of the velocity difference between disk and magnetosphere the boundary between the two is unstable to the Kelvin-Helmholtz instability. This instability is strongest within a ring around the radius of corotation. It leads to turbulent diffusion of disk material into the magnetosphere, and thus gives a sufficiently high accretion rate. Author (ESA)

N80-13563# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany).
INTERACTION OF ACCRETION DISK AND ROTATING MAGNETIC FIELD OF NEUTRON STAR c90
U. Anzer and G. Boerner *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 263-264 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Utilizing the instabilities of the boundary between disk and magnetosphere, a model for the flow of disk material into the neutron star's magnetosphere is constructed. It is shown that within a thin ring around the corotation radius, gas flows over. The gas is partly accelerated towards the neutron star producing the accretion partly outwards. In terms of this model, certain observed properties of pulsating X-ray sources are explained. Author (ESA)

N80-13564# Bonn Univ. (West Germany). Inst. fuer Astrophysik.
SPINDOWN OF ROTATING MAGNETS c90
W. Kundt *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 265-267 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The torque exerted on a rotating magnet by impinging plasma was derived from certain general assumptions plus conservation laws. Its relevance to binary evolution (neutron stars, white dwarfs, and in particular binary X-ray sources AM Her, 4U 0115+63, SS 433), to the generation of cosmic rays, and to the (early) planets and their satellites is explained. Author (ESA)

N80-13565# California Univ., Berkeley. Dept. of Astronomy and Space Sciences.
THE MAGNETOSPHERES OF MAGNETIC A STARS AND OF PULSARS c90
J. Arons *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 271-279 refs (For primary document see N80-13529 04-42)
(Grants NSF AST-77-23069; NSF AST-78-21070)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Aspects of the hydromagnetic structure of the magnetospheres surrounding magnetic A stars are considered and the magnetopause radius is estimated. Typical sizes exceed 10 AU. The supply of mass to the magnetosphere from the star is considered; a model for formation of a corona is suggested which relies on heating by the auroral dissipation at the magnetic poles. Plasma supply from planets contained within the magnetosphere is considered along with the possibility of discovering these planets from photons emitted as a consequence of the planet-magnetosphere interaction. A number of mechanisms for rotational spin down of magnetic a stars are considered. A new spin down theory based on emission of interstellar magnetosonic modes from the shear unstable magnetopause is suggested. A comparison is made to certain classes of pulsar models. Author (ESA)

N80-13566# Sussex Univ., Brighton (England).
THE BOUNDARY OF A PULSAR MAGNETOSPHERE: GAMMA-RAY PULSARS c90
N. J. Holloway *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 281-284 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The energetics of an aligned or nearly aligned pulsar magnetosphere are considered and the boundary is interpreted as that region in which the principal energetic processes take place. It is argued that these processes occur at or near the light cylinder and that they consist primarily of gamma ray emission and classical magnetic dipole radiation. The gamma ray emission becomes dominant at very small angles of nonalignment as the dipole radiation is reduced by alignment. This dominance of the gamma ray emission represents the late stages of pulsar evolution. Author (ESA)

N80-13567# Centre de Recherches en Physique de l'Environnement Terrestre et Planetaire, Orleans (France).
KINETIC THEORY OF THE BOUNDARY LAYER BETWEEN A FLOWING ISOTROPIC PLASMA AND A MAGNETIC FIELD c46
L. R. O. Storey and L. Cairo *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 289-293 refs Sponsored by UK. Sci. Res. Council. (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Assuming that the direction of flow is parallel to the applied magnetic field, conditions are defined on which the boundary layer can exist in static equilibrium at any flow speed. They are not met at the Earth's magnetopause, but could apply at similar boundaries in laboratory plasmas. Granted these conditions, the small scale structure of the layer was calculated by means of a simplified kinetic theory and results are presented for a hydrogen plasma with equal electron and ion velocity. The question of the stability of these structures remains open. Author (ESA)

N80-13568# Institut d'Aeronomie Spatiale de Belgique, Brussels.
A MICROSCOPIC DESCRIPTION OF INTERPENETRATED PLASMA REGIONS **c46**
M. A. Roth *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 295-309 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

A model of steady state tangential discontinuities is developed using the kinetic theory of multicomponents collisionless plasmas. The magnetopause layer and the inner edge of the plasma boundary layer are considered as regions where two different hydrogen plasmas are interpenetrated and the model is used to describe their microstructures. Large field-aligned currents are generated at the magnetopause and may constitute a part of the field-aligned currents observed in the cusps. A stability study shows that the electron layers are nearly always unstable. The thickness of stable ion layers increases with increasing values of the temperature ratio (T+/T-) and/or with decreasing density variations. This thickness represents also 2.5 ion gyroradii when (T+/T-) becomes larger than 5. A minimum magnetopause thickness is founp equal to 100 km. Author (ESA)

N80-13569# Institut fuer Weltraumforschung, Graz (Austria). Oesterreichische Akademie der Wissenschaften.
SOLUTION OF THE CHAPMAN-FERRARO PROBLEM WITHIN TWO DIMENSIONS **c46**
H. Ruckner and H. Biernat *In* ESA Magnetospheric Boundary Layer Aug. 1979 p 311-314 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The magnetic field structure of the Earth's magnetosphere and its boundary (the magnetopause) is calculated with the conformal mapping method. According to this method the solution is restricted to two dimensions, whereby the noon-midnight meridian plane is taken into consideration. Two boundary conditions define the potential problem which is determined in total self consistence. The normal component of the total magnetic field vanishes at the magnetopause and the kinetic plasma pressure of the solar wind balances the magnetic pressure. The configuration of the magnetopause and the magnetospheric field line structure is represented. The shape of the boundary is compared with other magnetopause models indicating a remarkable agreement. Author (ESA)

N80-13570# Technische Hochschule, Darmstadt (West Germany). Angewandte Geophysik.
INFLUENCE OF THE INTERPLANETARY MAGNETIC FIELD ON THE POSITION OF THE DAYSIDE MAGNETOPAUSE **c46**
G. H. Voigt *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 315-321 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The inward movement of the subsolar stagnation point of the Earth's magnetosphere when the interplanetary magnetic field turns from northward to southward in terms of the following assumptions: (1) there is a time averaged topology of interconnected field lines; ahd (2) the displacement of the subsolar point due to field line erosion can be described on the level of the fluid (MHD) theory for steady state conditions. Model calculations result in an analytical formula which expresses the stand off distance as a function of the solar wind plasma parameters and an IMF component. The IMF related difference in the average position of the stagnation point is not independent of the solar wind dynamical pressure. Author (ESA)

N80-13571*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
RATES OF MASS, MOMENTUM, AND ENERGY TRANSFER AT THE MAGNETOPAUSE **c46**
T. W. Hill *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 325-332 refs (For primary document see N80-13529 04-42)
(Grants NGR-44-006-137; NSF ATM-77-12619)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

Empirical estimates of the global rates of transfer of solar wind mass, tangential momentum, and energy at the Earth's magnetopause are presented for comparison against model estimates based on the four principal mechanisms that have been proposed to explain such transfer. The comparisons, although not quite conclusive, strongly favor a model that incorporates some combination of direct magnetic connection and anomalous cross field diffusion. An additional global constraint, the rate at which magnetic flux is cycled through the magnetospheric convection system, strongly suggests that direct magnetic connection plays a significant if not dominant role in the solar wind/magnetosphere interaction. Author (ESA)

N80-13572# Imperial Coll. of Science and Technology, London (England).
THE FORMATION AND PROPERTIES OF BOUNDARY LAYERS DOWNSTREAM FROM NEUTRAL LINES IN AN OPEN MAGNETOSPHERE **c46**
S. W. H. Cowley *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 333-342 refs Sponsored by UK Sci. Res. Council. (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The acceleration of plasma in the current sheets downstream from magnetic neutral lines is discussed in relation to both the dayside magnetopause and the geomagnetic tail. In both cases, the accelerated plasma is expected to form a layer adjacent to the current sheet on either side in which it streams along the field lines away from the neutral line through the incoming unaccelerated plasma. It is argued, however, that the properties of these boundary layer flows will be very different on the dayside and in the tail due to the different properties of the incoming source plasmas. The downstream plasma populations arising from these layers will also be different, due to the differing connectivities of the downstream reconnected field lines. Author (ESA)

N80-13573# California Univ., Los Angeles. Dept. of Atmospheric Sciences.
ANTIPARALLEL MERGING, THE HALF-WAVE RECTIFIER RESPONSE OF THE MAGNETOSPHERE, AND CONVECTION **c46**
N. U. Crooker *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 343-348 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

In some ways the magnetosphere behaves as if merging occurs only when the interplanetary magnetic field (IMF) is southward, and in other ways it behaves as if merging occurs for all IMF orientations. An explanation of this duality is offered in terms of a geometrical antiparallel merging model which predicts merging for all IMF orientations, but magnetic flux transfer to the tail only for southward IMF. Observations interpreted in terms of the model indicate that on the average, merging and viscous interaction contribute equally to magnetospheric convection. Author (ESA)

N80-13574*# Rice Univ., Houston, Tex.
INTERNAL MAGNETOSPHERIC PLASMA FLOW **c46**
J. W. Freeman *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 351-355 refs Co-sponsored by NASA and NSF (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

Experimental evidence indicates that there exist at least two separate circulation patterns within the magnetosphere which allow cold heavy plasmaspheric ions, which drift toward the dayside magnetopause, to be transported to the plasma sheet for acceleration and reinjection into the inner magnetosphere. The first of these results in the ions being transported over the polar regions in the plasma mantle. The mantle ultimately joins the plasma sheet at great distance in the tail via the lobe electric field. The second circulation pattern is embodied in the low latitude boundary layer. Recent data show that the extension of the low latitude boundary layer in the tail at 60 Earth radii turns inward to directly feed the plasma sheet. A means of estimating the fractional role played by each is to compare the electric potential drop across the low latitude boundary layer with the total cross tail convection electric potential. This was done for a set of tail crossings using ALSEP/SIDE data. The result is that the boundary layer contains about 20% of the potential drop across the tail. Author (ESA)

N80-13575*# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
MAGNETOPAUSE KELVIN-HELMHOLTZ INSTABILITY c46
D. J. Southwood *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 357-364 refs (For primary document see N80-13529 04-42)
(Contract NAS5-20064; Grant NSF ATM-74-23464)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

The Kelvin-Helmholtz instability as it applies to the dayside magnetopause is reviewed. Simple theory suggests the boundary should generally be unstable to waves moving at a large angle to the Earth's field. Nonlinear effects, how amplitudes might be limited, and what dynamic role the instability could have in boundary regions in stimulating mass and momentum transfer are discussed. Examination of data from a particular ISEE spacecraft pass shows relatively small amplitude (750 km) waves present on the boundary. Corresponding wavelength estimates show wave momentum is not significant at the time of the pass. Author (ESA)

N80-13576# Institut d'Aeronomie Spatiale de Belgique, Brussels.
IMPULSIVE PENETRATION OF SOLAR WIND AND ITS EFFECTS ON THE UPPER ATMOSPHERE c46
J. Lemaire *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 365-373 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Impulsive penetration of solar wind plasma irregularities, which transfers energy, momentum, and particles into the magnetosphere, is studied. The effects on the upper atmosphere are examined and discussed. The heat deposition in the E-region (and above) due to Joule dissipation of depolarization current is evaluated and compared to the energy production due to the absorption of solar radiation. The wind speed imparted to ionospheric plasma in the throat region and over the polar cap is compared to the observed convection velocities. The impulsive injections of magnetosheath-like plasma observed at low altitudes in the dayside cusps are interpreted as consequences of field aligned expansions (spreadings) of engulfed solar wind filaments (intrusions) into the magnetosphere. Author (ESA)

N80-13577*# Texas Univ. at Dallas, Richardson. Center for Space Sciences.
IMPULSIVE PENETRATION AND VISCOUS INTERACTION c46
W. J. Heikkila *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 375-380 refs Co-sponsored by NSF (For primary document see N80-13529 04-42)
(Grant NsG-5085)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

How the magnetosheath plasma enters the entry layer and low latitude boundary layers, with the particle energy spectra almost unchanged is investigated. It was proposed by Lemaire that this is accomplished by impulsive penetration of plasma clouds of plasmoids. Once inside the magnetosphere, a plasmoid with its own momentum will polarize, to create its own electric field for continued motion. This voltage generator charges up the sides of the boundary layers, in the process creating the internal magnetospheric electric field. The entry layer particles will gradient and curvature drift, constituting still another generator, a current generator, to power magnetospheric plasma processes. This may be the explanation for the viscous interaction first proposed by Axford and Hines. Author (ESA)

N80-13578# Southampton Univ. (England). Dept. of Physics.
TOWARDS A MORE QUANTITATIVE UNDERSTANDING OF DAYSIDE MAGNETOPAUSE CURRENTS c46
M. A. Saunders and M. J. Rycroft *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 381-384 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

Considering the magnetopause as a thin current sheet, and applying Maxwell's third equation to a vector superposition of magnetic fields of different origins, the orthogonal components of the magnetopause current intensity can be determined. Analyses of ISEE and HEOS 2 magnetometer data for the dayside magnetopause, outer cusp, and near earth magnetotail regions show that the magnetopause current possesses both a magnetospheric magnetic field aligned component and a cross field (Chapman-Ferraro) component. Further, it appears that particularly at low latitudes near noon, the magnetospheric magnetic field aligned component is a useful parameter with which to these calculated magnetopause field aligned currents, and their variations with both the dawn-dusk component of the interplanetary magnetic field and local time, are investigated in relation to statistical studies of the high latitude ionospheric Birkeland current flow. Author (ESA)

N80-13579# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).
INTERACTION BETWEEN THE MAGNETOSPHERIC BOUNDARY LAYERS AND THE IONOSPHERE c46
V. M. Vasyliunas *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 387-393 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

The high latitude ionosphere is connected by magnetic field lines to the various observed magnetospheric boundary layers as well as (via open magnetic field lines) to the magnetosheath. The electrodynamic interaction between the ionosphere and the boundary regions is governed by the same self consistent chain of equations as the ionosphere magnetosphere interaction at lower latitudes. The plasma flow in the boundary region interacts with the ionosphere analogously to an MHD dynamo. In response to the imposed electric fields, field aligned (Birkeland) currents flow into and out of the ionosphere. The theoretically deduced pattern of these Birkeland currents is qualitatively similar to their observed pattern. Pressure gradients within the ring current region interact, via ionospheric closure of their associated Birkeland currents, with the magnetosphere ionosphere MHD dynamo driven by boundary region flow. Author (ESA)

N80-13580# Max-Planck-Institut fuer Extraterrestrische Physik, Garching (West Germany).
THEORY OF THE LOW ATTITUDE BOUNDARY LAYER c46
B. U. Oe. Sonnerup *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 395-397 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

A one dimensional steady state fluid mechanical model is developed of the low latitude plasma boundary layer inside the dawn and dusk magnetopause. Momentum transfer in the layer is produced by viscosity and/or mass diffusion. Coupling to the ionosphere is achieved via field aligned currents, the magnitude of which is limited by parallel potential drops. These currents flow into and out of the ionosphere in the manner described by Iijima and Potemra. The higher latitude (region 1) currents are associated with the boundary layer proper, the lower latitude (region 2) ones with a region of sunward return flow adjacent to the boundary layer. The parallel potential drops have the typically observed magnitude of 2 to 3 kV and a north south extent of 100 to 200 km. Ionospheric electric fields and field aligned current strengths are also in approximate agreement with observations. Author (ESA)

N80-13581*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ELECTROMAGNETIC STRUCTURE OF THE MAGNETOPAUSE AND BOUNDARY LAYER c46
B. U. O. Sonnerup (Max-Planck-Inst. fuer Extraterrestrische Phys., Garching, West Germany) and B. G. Ledley *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 401-410 refs (For primary document see N80-13529 04-42)
(Grants NsG-7292; NSF ATM-74-08223)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

After a review of the properties and predictions of the closed and open models of the magnetopause, OGO-5 magnetometer data are used to illustrate various observed signatures of the magnetopause current layer and the adjacent plasma boundary layer. Among the topics touched upon are: fluctuations, diamagnetic effects, and field aligned currents in the boundary layer; one dimensionality of the magnetopause; presence and absence of a magnetic field component perpendicular to the magnetopause; finite ion gyroradius effects. A brief summary is given of existing Vlasov theory for the description of tangential,

rotational, and contact discontinuities. Special attention is paid to the tangential momentum balance and the jump conditions at a rotational discontinuity. Low frequency fluctuations are discussed with emphasis on the signatures of the tearing mode. Author (ESA)

N80-13582# Department of Energy, Washington, D. C. Office of Basic Energy Sciences.
SUMMARIES OF PHYSICAL RESEARCH IN THE GEOSCIENCES
Aug. 1979 65 p refs
(DOE/ER-0030) Avail: NTIS HC A04/MF A01

The Earth, atmospheric, and solar/terrestrial sciences which relate to the development of energy technology are summarized. The topics covered include: geology, geophysics, and Earth dynamics; geochemistry; energy resource recognition, evaluation, and utilization; hydrologic and marine sciences; and solar-terrestrial/atmospheric interactions. R.C.T.

N80-13583# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Astronomische und Physikalische Geodaesie.
SATELLITE CONTRIBUTIONS TO TIDAL STUDIES
Demosthenes Christodoulidis 1978 35 p refs Sponsored by Deut. Forschungsgemeinschaft
(TUM-MITT-147) Avail: NTIS HC A03/MF A01

The earth's tidal potentials, including solid earth tides, oceanic tides, and atmospheric tides, are analyzed based on the perturbations in the orbits of the Earth's artificial satellites. Tidal parameters are derived from the mean Keplerian elements of satellite motion. The gathering of a sufficient quantity of satellite data of sufficient quality is discussed. Results show that the computation of tidal parameters based on this method is, at present, unsatisfactory. However, satellite data can be used to improve existing tidal models. Author (ESA)

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N80-13584 Columbia Univ., New York.
LONG WATER WAVE PROPAGATION UNDER THE INFLUENCE OF THE DEPTH VARIATION. PART 1: LONG WATER WAVES INCIDENT UPON A TRANSITION ZONE OF AN EXPONENTIAL DEPTH VARIATION. PART 2: LONG WATER WAVES INCIDENT UPON A SEAMOUNT MODEL OF A LINEARLY CYLINDRICAL DEPTH VARIATION Ph.D. Thesis
Shao-Sin Lee 1979 144 p
Avail: Univ. Microfilms Order No. 7924926

Analytic solutions of wave height are obtained for the long water wave from the deep water zone obliquely incident upon the transition zone of an exponential depth variation to the shallow water zone of a continental slope. The transmission coefficient in the shallow water zone and the reflection coefficient in the deep water zone critically depend upon the width of the transition zone, the wavelength, and the angle of incidence of the incident wave. A seamount was represented by a topped-cone model with a radial depth variation. The incident plane wave was decomposed into a series of cylindrical wave modes of the Bessel function type, corresponding to the modes of cylindrical scattering into the deep water zone and the modes of transmission into the shallow water zone. Numerical evaluations of the scattering and transmission coefficients of each mode slow that these coefficients critically depend upon the incident wavelength, the radius of the seamount model, and the depth ratio of the deep water to the shallow water zones. The total response of wave height was obtained by summing all the modes. Dissert. Abstr.

N80-13585* National Aeronautics and Space Administration, Washington, D. C.
EARTH RESOURCES. A CONTINUING BIBLIOGRAPHY WITH INDEXES, ISSUE 23
Oct. 1979 70 p
(NASA-SP-7041(23)) Avail: NTIS HC E05 CSCL 05B

This bibliography lists 226 reports, articles, and other documents introduced into the NASA scientific and technical information system between July 1, 1979 and September 30, 1979. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis. J.M.S.

N80-13586 Northwestern Univ., Evanston, Ill.
THE FATE OF DISSOLVED ALUMINUM WITHIN THE OCEANS Ph.D. Thesis
Marc Andre Stoffyn 1979 167 p
Avail: Univ. Microfilms Order No. 7927458

The processes and mechanisms controlling the concentration and distribution of dissolved aluminum within the oceans were investigated using five vertical hydrographic profiles sampled in the Atlantic Ocean and in the Mediterranean Sea. The concentrations of dissolved silica and aluminum covary in the surface waters of high productivity areas and exhibit minima in the photic zone. A tentative cycle of dissolved Al within the oceanic system is presented. Biological cycling constitutes an important subcycle of dissolved Al within the oceans. However, to maintain the deep water reservoir of the oceans at steady state, dissolved Al must be removed from the deep waters by reactions with aluminum minerals or iron hydroxides. The cycle of dissolved Al presented maintains the entire oceanic system at steady state with respect to dissolved Al. Dissert. Abstr.

N80-13587*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A REPORT ON FIELD WORK IN THE CITY OF PARAGOMINAS (PA) [RELATORIO DO TRABALHO DE CAMPO NO MUNICIPIO DE PARAGOMINAS (PA)]
Nelson deJesusParada, Principal Investigator, Armando Pacheco dosSantos, Evlyn Marcia Leao deMoraesNovo, Valdete Duarte, and Francisco Luna Toledo May 1979 75 p refs In PORTUGUESE; ENGLISH summary Sponsored by NASA Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 ERTS
(E80-10001; NASA-CR-162378; INPE-1481-RPE/028) Avail: NTIS HC A04/MF A01 CSCL 08B

There are no author-identified significant results in this report.

N80-13588*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
DIGITAL PROCESSING OF LANDSAT MSS AND TOPOGRAPHIC DATA TO IMPROVE CAPABILITIES FOR COMPUTERIZED MAPPING OF FOREST COVER TYPES Quarterly Progress Report, 16 Apr. - 15 Jul. 1979
Roger M. Hoffer, Principal Investigator Jul. 1979 8 p EREP (Contract NAS9-15508)
(E80-10009; NASA-CR-160312; LARS-071579) Avail: NTIS HC A02/MF A01 CSCL 08B

There are no author-identified significant results in this report.

N80-13589*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
LARGE AREA CROP INVENTORY EXPERIMENT (LACIE). EXPERIMENT PLAN FOR EVALUATION OF LANDSAT AGRONOMIC VARIABLES USING WHEAT INTENSIVE TEST SITES
D. E. Phinney, Principal Investigator Aug. 1979 27 p refs Sponsored by NASA, NOAA, and USDA EREP
(Contract NAS9-15800)
(E80-10010; NASA-CR-160315; JSC-16020; LEC-13632) Avail: NTIS HC A03/MF A01 CSCL 02C

There are no author-identified significant results in this report.

N80-13590*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.

LARGE AREA CROP INVENTORY EXPERIMENT (LACIE). EVALUATION OF THE LACIE TRANSITION YEAR CROP CALENDAR MODEL
R. E. Cheffin and S. K. Woolley, Principal Investigators Jul. 1979 22 p refs Sponsored by NASA, NOAA, and USDA EREP
(Contract NAS9-15800)
(E80-10011; NASA-CR-160314; JSC-16019; LEC-13482)
Avail: NTIS HC A02/MF A01 CSCL 02C

The author has identified the following significant results. The estimates of developmental stage dates from the LACIE adjustable crop calendar (ACC) winter wheat model was somewhat more accurate than the historical crop calendar after jointing. The ACC winter wheat model was not so accurate for the Texas Panhandle as it was for the other areas of the USPG-7 because dry soil conditions delayed fall planting in the Panhandle. Since the LACIE ACC winter wheat model does not contain a moisture term and it was started with historical planting dates, lengthy delays in planting mean that the ACC model will probably be started early and will estimate the developmental growth stages to occur too early in the season. The LACIE ACC spring wheat model was also started early in most areas because of late planting due to fields wet from melting snow and rain. The starter model used to estimate spring planting dates was not accurate under these wet soil conditions and tended to predict the developmental stages to occur earlier than the dates observed in the fields.

N80-13591*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
LARGE AREA CROP INVENTORY EXPERIMENT (LACIE). LIST SPECTRAL KEYS STUDY
T. B. Dennis and M. D. Pore, Principal Investigators Aug. 1979 19 p refs Sponsored by NASA, NOAA, and USDA EREP
(Contract NAS9-15800)
(E80-10012; NASA-CR-160338; JSC-15042; LEC-13456)
Avail: NTIS HC A02/MF A01 CSCL 08F

There are no author-identified significant results in this report.

N80-13592*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
EARTH OBSERVATIONS DIVISION EARTH RESOURCES DATA ANALYSIS CAPABILITIES
F. Tragni, Principal Investigator Jul. 1979 86 p refs Revised EREP
(Contract NAS9-15800)
(E80-10013; NASA-CR-160339; LEC-3949-Rev-D; JSC-16030-Rev-D) Avail: NTIS HC A05/MF A01 CSCL 05B

There are no author-identified significant results in this report.

N80-13593*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
LARGE AREA CROP INVENTORY EXPERIMENT (LACIE). PHASE 3 DIRECT WHEAT STUDY OF NORTH DAKOTA
M. C. Kinsler, J. D. Nichols, and A. L. Ona, Principal Investigators Apr. 1979 158 p refs Sponsored by NASA, NOAA, and USDA EREP
(Contract NAS9-15800)
(E80-10014; NASA-CR-160340; JSC-14744; LEC-12980)
Avail: NTIS HC A08/MF A01 CSCL 02C

The author has identified the following significant results. The green number and brightness scatter plots, channel plots of radiance values, and visual study of the imagery indicate separability between barley and spring wheat/oats during the wheat mid-heading to mid-ripe stages. In the LACIE Phase 3 North Dakota data set, the separation time is more specifically the wheat soft dough stage. At this time, the barley is ripening, and is therefore, less green and brighter than the wheat. Only 4 of the 18 segments studied indicate separation of barley/other spring small grain, even though 11 of the segments have acquisitions covering the wheat soft dough stage. The remaining seven segments had less than 5 percent barley based on ground truth data.

N80-13594*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
LARGE AREA CROP INVENTORY EXPERIMENT (LACIE). PHASE 3 LABELING ERROR CHARACTERIZATION Final Report
N. James Clinton, Principal Investigator Mar. 1979 77 p refs Sponsored by NASA, NOAA, and USDA EREP
(Contract NAS9-15800)
(E80-10015; NASA-CR-160341; JSC-14745; LEC-13012)
Avail: NTIS HC A05/MF A01 CSCL 02C

There are no author-identified significant results in this report.

N80-13595*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
LARGE AREA CROP INVENTORY EXPERIMENT (LACIE). A REVISED SCREENING PROCEDURE FOR LACIE PHASE 3 DATA IN THE US GREAT PLAINS
R. S. Chhikara, Principal Investigator Aug. 1979 9 p refs Sponsored by NASA, NOAA, and USDA EREP
(Contract NAS9-15800)
(E80-10016; NASA-CR-160313; JSC-14852; LEC-12723)
Avail: NTIS HC A02/MF A01 CSCL 02C

The author has identified the following significant results. The screening procedure resulted in a substantial decrease in the official LACIE winter acreage estimate, bringing the two estimates into better agreement with corresponding USDA/ESCS estimates.

N80-13596*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
TEXAS APPLICATIONS SYSTEM VERIFICATION AND TRANSFER REMOTE SENSING INFORMATION SUB-SYSTEM: FUNCTIONAL DESIGN
M. L. Brown, Jr., Principal Investigator, A. M. Fails, M. V. Martin, A. S. Story, and E. A. Weisblatt Mar. 1979 405 p EREP
(Contract NAS9-15800)
(E80-10017; NASA-CR-160342; LEC-13258; JSC-14785)
Avail: NTIS HC A18/MF A01 CSCL 05B

There are no author-identified significant results in this report.

N80-13597*# Institut National de la Recherche Agronomique, Paris (France).
ESTIMATES OF REGIONAL ET FROM HCMM DATA: SUMMARY OF 1977 EXPERIMENT AND FINAL ARRANGEMENT FOR 1978 IN SOUTHEASTERN FRANCE TEST SITE
Bernard Seguin, Principal Investigator [1979] 29 p refs Sponsored by NASA ERTS
(E80-10018; NASA-CR-162390) Avail: NTIS HC A03/MF A01 CSCL 05B

There are no author-identified significant results in this report.

N80-13598*# Commission of the European Communities, Ispra (Italy).
SOIL MOISTURE AND HEAT BUDGET EVALUATION IN SELECTED EUROPEAN ZONES OF AGRICULTURAL AND ENVIRONMENTAL INTEREST Progress Report, 1 Apr. - 31 Aug. 1979
1978 50 p refs Sponsored by NASA ERTS
(Proj. TELLUS)
(E80-10019; NASA-CR-162391; PR-1) Avail: NTIS HC A03/MF A01 CSCL 08M

There are no author-identified significant results in this report.

N80-13599*# Institute of Hydrology, Wallingford (England).
THE ESTIMATION OF SOIL MOISTURE CONTENT AND ACTUAL EVAPOTRANSPIRATION USING THERMAL INFRA-RED REMOTE SENSING
R. J. Gurney, Principal Investigator 1978 20 p refs Sponsored by NASA ERTS
(Proj. TELLUS)
(E80-10021; NASA-CR-162393) Avail: NTIS HC A02/MF A01 CSCL 08M

There are no author-identified significant results in this report.

N80-13600*# Commission of the European Communities, Ispra (Italy).
BEAUCE TELLUS PROJECT [CAMPAGUE TELLUS BEAUCE]
30 Sep. 1977 21 p In FRENCH Sponsored by NASA ERTS (E80-10024; NASA-CR-162396) Avail: NTIS HC A02/MF A01 CSCL 05B

There are no author-identified significant results in this report.

N80-13601*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DEVELOPMENT OF MINING GUIDANCE AND CONTROL SYSTEMS Annual Report, Oct. 1976 - Sep. 1977
May 1979 225 p refs
(Contract DI-BM-H0155092)
(NASA-TM-78226; ALW-11) Avail: NTIS HC A10/MF A01 CSCL 08I

New fundamental interface sensor concepts were identified and investigated including tabulation of the physical and performance characteristics of two new interface detector concepts: - natural background radiation and magnetic spin resonance. Studies of guidance and control techniques for the longwall miner identified three basic systems for use in automated/remote controlled longwall mining. The following projects were initiated: system study which will more completely define the longwall guidance and control system design concepts; integration of the various control functions (vertical, yaw, and roll); and hardware technical requirements. R.E.S.

N80-13602# Institute for Water Resources, Fort Belvoir, Va.
WETLAND VALUES CONCEPTS AND METHODS WETLANDS EVALUATION Final Report
Richard T. Reppert, Wayne Sigleo, Eugene Stakhiv, Larry Messman, and Caldwell D. Meyers Mar. 1979 117 p refs (AD-A069088; IWR-RR-79-R1) Avail: NTIS HC A06/MF A01 CSCL 08/6

This report presents concepts and methods for the evaluation of wetlands pursuant to Section 404, PL 92-500 (as amended), President Carter's May 24, 1977 Executive Order on wetlands protection, and other statutory and administrative authorities. The evaluation of wetlands is based on the analysis of their physical, biological and human use characteristics. The report discusses these functional characteristics and identifies specific criteria for determining the efficiency with which the respective functions are performed. Two potential wetlands evaluation methods are described. One is a nonquantitative method in which individual wetland areas are evaluated based on the deductive analysis of their individual functional characteristics. The other is a semi-quantitative method in which the relative values of two or more site alternatives are established through the mathematical rating and summation of their functional relationships. The specific functions and values of wetlands which are covered in this report are (1) natural biological functions, including food chain productivity and habitat, (2) their use as sanctuaries, refuges or scientific study areas, (3) shoreline protection, (4) groundwater recharge, (5) storage for flood and storm water, (6) water quality improvement, (7) hydrologic support, and (8) various cultural values. GRA

N80-13603# SRI International Corp., Menlo Park, Calif.
INTERACTIVE AIDS FOR CARTOGRAPHY AND PHOTO INTERPRETATION Semiannual Technical Report, 12 Oct. 1978 - 11 May 1979
Martin A. Fischler, G. J. Agin, H. G. Barrow, R. C. Bolles, L. H. Quam, J. M. Tenenbaum, and H. C. Wolf May 1979 31 p refs
(Contract DAAG29-76-C-0057; ARPA Order 2894)
(AD-A073452) Avail: NTIS HC A02/MF A01 CSCL 08/2

The central scientific goal of the ARPA Image-Understanding Project research program at SRI International is to investigate and develop ways in which diverse sources of knowledge may be brought to bear on the problem of interpreting images. The research is concerned with specific problems that arise in processing aerial photographs for such military applications as cartography, intelligence, weapon guidance, and targeting. A key concept is the use of a generalized digital map to guide the process of image analysis. In the present phase of our program, the primary focus is on developing a 'road expert,' whose purpose is to monitor and interpret road events in aerial imagery. The objectives, methodology, and current status of our research are described in this report. Particular technical topics include data base construction and shadow and anomaly analysis. GRA

N80-13604# Michigan State Univ., East Lansing. W. K. Kellogg Biological Station.
DISSOLVED ORGANIC MATTER AND LAKE METABOLISM Technical Progress Report, 1 Jul. 1978 - 30 Jun. 1979
R. G. Wenzel 1979 68 p refs
(Contract EY-76-S-02-1599)
(COO-1599-153-Pt-1) Avail: NTIS HC A04/MF A01

Qualitative and quantitative cycling and metabolism of particulate and dissolved organic carbon in lakes and their inflow sources (surface and subsurface) were investigated. Emphasis was placed on the sources, fates, and interactions of dissolved and particulate organic matter in relation to inorganic chemical cycling, allochthonous loading to the lake system, and the coupled nutrient physiology and metabolism of phytoplankton, bacterial populations, macrophytes, and attendent sessile algal-bacterial communities. Regulatory mechanisms of growth and rates of carbon and nutrient cycling were evaluated among the (1) inorganic-organic influxes of allochthonous sources as they are controlled by wetland littoral communities, (2) the littoral photosynthetic producer-decomposer complex, and (3) the microflora of the pelagial zone. DOE

N80-13605# Oak Ridge National Lab., Tenn.
GEOPRESSURE ENERGY RESOURCE EVALUATION
G. Samuels May 1979 76 p refs
(Contract W-7405-eng-26)
(ORNL/PPA-79/2) Avail: NTIS HC A05/MF A01

The geopressured aquifers that extend along the northern Gulf of Mexico are perhaps the largest potential source of geothermal energy and natural gas in the United States. Because of the high cost of completing wells into these formations and their relatively low temperatures (200 to 400 F), the utilization of the geothermal energy will be highly dependent on, and of secondary importance to, the value of the methane. The economics of extracting either the geothermal energy or natural gas from these aquifers does not look promising. The combined requirements of high well flow rates (40,000 bbl/day), long life (20 years), and the necessity for close well spacing to minimize the cost of the collection system may be incompatible with the actual characteristics of the reservoirs. These factors place such stringent requirements on the reservoir size, permeability, and compressibility, or specific storage coefficient, that the number of promising production areas may be severely limited. DOE

N80-13606# Edgerton, Germeshausen and Grier, Inc., Las Vegas, Nev.
DEVELOPMENT OF AN AIRBORNE GAMMA RADIATION SYSTEM FOR SNOW SURVEYS
Allen E. Fritzsche 1979 10 p refs Presented at Workshop on Remote Sensing of Snow and Soil Moisture by Nucl. Techniques, Voss, Norway, 23 Apr. 1979
(Contract EY-76-C-08-1183)
(EGG-1183-1679; CONF-790495-1) Avail: NTIS HC A02/MF A01

The use of NaI(T1) gamma detectors with a full gamma energy spectrum pulse height analyzer together with a small computer provides a self contained and flexible system for snow surveys. The dual detector method determines atmospheric radon perturbations in the detection system. Detailed calibration experiments must be performed to determine twenty parameters that describe the physical nature of the system. Multiple high altitude and lake flights are used to obtain background components. Simulation pads, loaded with varying concentrations of K-40, Th-232, and U-238, yield photopeak stripping coefficients and basic system sensitivity. Multiple altitude flights over land lines provide air attenuation coefficients which may be converted to water attenuation coefficients. DOE

N80-13607# Department of Energy, Washington, D. C. Energy Information Administration.
CURRENT U. S. PETROLEUM SITUATION AND SHORT-TERM SUPPLY/DEMAND OUTLOOK

Emil L. Nelson, G. D. Butler, C. Dwyer, and S. Wagner Jun 1979 50 p
(DOE/EIA-0184/5) Avail: NTIS HC A03/MF A01

Potential U.S. supply shortfalls indicate that U.S. consumption of petroleum products could not rise above the low end of the projected range without driving petroleum inventories down below generally accepted target levels to enter the 1979-1980 winter heating season. Preliminary data indicate that U.S. petroleum demand for the first quarter of 1979 appears to have been between the low and medium levels projected by the demand models. Estimated demand during April and May, when allocation of scarce supply appears to have limited the effective demand, falls below the low of the projected range by some 1/2 million barrels daily. Unless world supply conditions change significantly in the coming months, the analysis indicates that the United States may experience continual limitations on imports requiring effective efforts to limit consumption and make maximum use of alternative fuels. DOE

N80-13608# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Bereich fuer Projekttraegerschaften.

THE GEOSCIENTIFIC AIRBORNE REMOTE SENSING PROGRAM Final Report

Manfred Wahl Bonn Bundesmin. fuer Forsch. u. Technology Sep. 1978 233 p refs In GERMAN; ENGLISH summary Original contains color illustrations
(Contract BMFT-WE-0175)
(BMFT-FB-W-78-31) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 48,75

The Airborne Remote Sensing program, carried out from 1974 to 1977 in the Federal Republic of Germany, is part of an international operational system of earth observation satellites. Within five selected test areas, numerous flights were performed using different multispectral sensors. The data were systematically evaluated using advanced image processing procedures. The extensive results verify the significant contribution of remote sensing to the solution of application-oriented problems, such as environmental monitoring, and justify the continuation of this space program. Author (ESA)

N80-13609# World Meteorological Organization, Geneva (Switzerland). Hydrology and Water Resources Dept.

SPACE OBSERVATIONS FOR WATER RESOURCES: A POTENTIAL TO BE DEVELOPED

A. J. Askew and J. Nemec 1978 14 p refs Presented at 22d COSPAR Plenary Meeting, Bangalore, India, May-Jun. 1979
Avail: NTIS HC A02/MF A01

Information is presented concerning the data requirements that were established for work in hydrology and water resources and mention is made of the use of spacecraft for the transmission of hydrological data. It was concluded that a dialogue should be established between those supplying the data and investigating their potential uses and those actually engaged in the assessment and management of water resources. Author (ESA)

N80-13610# Centre National d'Etudes Spatiales, Paris (France). Direction des Programmes et de la Politique Industrielle.

SPOT, FRENCH PREOPERATIONAL REMOTE SENSING SATELLITE SYSTEM

Alan A. Scribot 1978 15 p refs Presented at 22d COSPAR Plenary Meeting, Bangalore, India, May-Jun. 1979
Avail: NTIS HC A02/MF A01

The SPOT remote sensing satellite system is described, including mission objectives, choice of orbit parameters for the first SPOT mission, the SPOT system architecture, the payload and choice of sensor parameters, the standard platform, and the ground segment. The payload consists of two high resolution visible sensors scanning 60 km each with 20 m resolution in several bands and 10 m resolution in the 0.5 to 0.9 micron (panchromatic) band. SPOT is suited for vegetation and water studies, cartographic applications, and geology. Author (ESA)

N80-13611# Zurich Univ. (Switzerland). Dept. of Geography.

SNOW MAPPING FROM SPACE PLATFORMS

K. I. Itten 1979 23 p refs Presented at 22d COSPAR Plenary Meeting, Bangalore, India, May-Jun. 1979 Submitted for publication
Avail: NTIS HC A02/MF A01

Present knowledge of snow mapping from space is reviewed, discussing the problems of optimum resolution, periodicity, features to be measured, and wavelength bands to be used. The requirements for analog and digital data analysis are described, recommendations given, and questions on the economic implementation of such methods raised. It is concluded that the various newly developed satellites for meteorology, Earth and marine resources do not yet constitute a major breakthrough in solving the task of snow mapping. Author (ESA)

N80-13612# National Technical Information Service, Springfield, Va.

REMOTE SENSING APPLIED TO GEOLOGY AND MINERALOGY. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1973 - Jul. 1979

Audrey S. Hundemann Aug. 1979 189 p Updates NTIS/PS-76/0500 Supersedes NTIS/PS-78/0791; NTIS/PS-77/0676
(NTIS/PS-79/0844/5; NTIS/PS-78/0791; NTIS/PS-77/0676)
Avail: NTIS HC $28.00/MF $28.00 CSCL 08G

The use of LANDSAT satellites and other remote sensing methods in geological and mineralogical applications is discussed. Abstracts cover rock and soil mapping, terrain analysis, direct and indirect mineral exploration, fault tectonics, and general geologic studies of various countries. A few abstracts pertain to equipment and techniques used in the studies. This updated bibliography contains 180 abstracts, 33 of which are new entries to the previous edition. GRA

N80-13613# New Mexico Univ., Albuquerque. Technology Application Center.

REMOTE SENSING APPLIED TO GEOLOGY. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1977 - Jun. 1979

Gerald F. Zollars Aug. 1979 53 p Sponsored by NTIS
(NTIS/PS-79/0822/1) Avail: NTIS HC $28.00/MF $28.00 CSCL 08G

This bibliography cites 215 articles concerning LANDSAT images, satellite-borne photography, aerial photography, and radar techniques being used to conduct geological surveys. Articles concerning photomapping and photo interpretation techniques relating to resource exploration are stressed. GRA

N80-13614# National Technical Information Service, Springfield, Va.

REMOTE SENSING APPLIED TO ENVIRONMENTAL POLLUTION DETECTION AND MANAGEMENT. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jul. 1979

Audrey S. Hundemann Aug. 1979 176 p Supersedes NTIS/PS-78/0789; NTIS/PS-77/0674
(NTIS/PS-79/0842/9; NTIS/PS-78/0789; NTIS/PS-77/0674)
Avail: NTIS HC $28.00/MF $28.00 CSCL 13B

The application of remote sensing methods to air, water, and noise pollution problems is discussed. Topic areas cover characteristics of dispersion and diffusion by which pollutants are transported, eutrophication of lakes, thermal discharges from electric power plants, outfalls from industrial plants, atmospheric aerosols under various meteorological conditions, monitoring of oil spills, and application of remote sensing to estuarian problems. This updated bibliography contains 167 abstracts, 11 of which are new entries to the previous edition. GRA

N80-13615# National Technical Information Service, Springfield, Va.

REMOTE SENSING APPLIED TO URBAN AND REGIONAL PLANNING. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jul. 1979

Audrey S. Hundemann Aug. 1979 74 p Supersedes NTIS/PS-78/0790 and NTIS/PS-77/0675
(NTIS/PS-79/0843/7; NTIS/PS-78/0790; NTIS/PS-77/0675)
Avail: NTIS HC $28.00/MF $28.00 CSCL 13B

Urban and regional planning using aerial photography and satellite remote sensing methods is discussed. Abstracts cover the use of remote sensing in land use mapping, traffic surveys and urban transportation planning, and taking inventories of natural resources for urban planning. Abstracts dealing with land use

and residential quality associated with and acting as an influence on health and physical well-being are included. This updated bibliography contains 65 abstracts, 2 of which are new entries to the previous edition. GRA

N80-13616# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).
ESTIMATION OF REGIONAL EVAPOTRANSPIRATION AND SOIL MOISTURE CONDITIONS USING REMOTELY SENSED CROP SURFACE TEMPERATURES
G. J. R. Soer Sep. 1977 31 p refs
(Rept-1003) Avail: NTIS HC A03/MF A01

The application of thermal infrared scanning to the measurement of aerial heat and water budgets of crop lands is considered. Emphasis is placed on obtaining regional evapotranspiration estimates, making water balance analyses for large areas more feasible. Also, crop production as correlated with the actual crop transpiration rate can be estimated. J.M.S.

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N80-13617 Pittsburgh Univ., Pa.
THEORETICAL ANALYSIS OF MULTI-CELL, HIGH EFFICIENCY BROAD SPECTRAL SENSITIVITY SOLAR CELLS Ph.D. Thesis
Richard Joseph McPartland 1978 227 p
Avail: Univ. Microfilms Order No. 7924749

A new scheme for interconnecting cells with different band gaps is described. This scheme allows for epitaxial device fabrication without intervening metallic layers or grids by employing a tunnel junction as an interface between the cells. Using this interface, a two-cell solar cell structure is proposed; npp+n+pp+. The npp+n+ portion has a wider band gap than the pp+ portion of the cell. A theoretical model is developed to be used as a design aid prior to device fabrication, to allow optimization of the solar cell's design, and to predict conversion efficiencies. The three components of the model are: the npp+ low-high junction (L-H junction) homojunction solar cell model; the n+pp+ L-H junction heterojunction solar cell model; and the p+n+ tunnel junction model. The current-voltage characteristics of the tunnel junction are represented by surface-recombination-velocities (SRVs) at either side of the junction's space-charge-layer. Dissert. Abstr.

N80-13618 Dayton Univ., Ohio.
TRANSIENT THERMAL ANALYSIS OF PHASE CHANGE MATERIAL ENERGY STORAGE SYSTEM Ph.D. Thesis
Bedru Yimer 1979 156 p
Avail: Univ. Microfilms Order No. 7925695

An analytical model was developed to determine the temperature distribution and interface location of phase change material energy storage systems. The model covers the general three-dimensional case where internal longitudinal fins were included inside the thermal energy storage material and it handles various types of boundary conditions at the walls of the thermal energy storage material containers. In the analysis, thermophysical properties were taken as different between the solid and liquid phases, and also as temperature dependent. The initial system temperatures were taken to be at or above fusion temperature. In the development of the governing equations the enthalpy approach, where enthalpy and temperature are the dependent variables, was employed. After the governing equations were expressed in terms of dimensionless variables, they were written in finite difference form. The Gauss-Seidel iterative method with successive over-relaxation was used to numerically solve the resulting nonlinear simultaneous equations for one-dimensional axisymmetric and two-dimensional systems. Dissert. Abstr.

N80-13619 Florida Univ., Gainesville.
DISTRIBUTION AND MOVEMENT OF ELECTROLYTE IN FUEL CELLS AND BATTERIES Ph.D. Thesis
Hau La-Thann 1979 196 p
Avail: Univ. Microfilms Order No. 7921936

The wettability of a heterogeneous porous medium comprising differently-wetted materials is characterized, and the competitive capillary effects between adjacent, differently-wetted porous media are described. The investigations consist mainly of theoretical considerations, and mathematical derivations based on simple models. A unified expression is derived for the liquid meniscus between two dissimilar, parallel walls. The two walls are found to absorb liquid by capillary action, independently of each other. The contact angle of the system obeys Cassie's law of cosine-average. Dissert. Abstr.

N80-13620 Virginia Univ., Charlottesville.
OXYGEN ELECTRODES FOR ENERGY CONVERSION, STORAGE, AND CONSERVATION: INVESTIGATION OF SIMPLE AND MIXED OXIDES Ph.D. Thesis
Craig Ryan Davidson 1978 150 p
Avail: Univ. Microfilms Order No. 7928054

Several simple and mixed oxide systems were investigated for oxygen evolution and reduction performance. Kinetic parameters were determined as a function of temperature to evaluate the oxides for use in advanced energy systems at elevated temperatures. The mixed spinel, $NiCo_2O_4$, is shown to be a promising oxygen evolution electrode material which is now undergoing long term evaluation. The role of the surface oxides of nickel was determined at elevated temperatures for oxygen evolution. Results may indicate an optimum temperature for the use of nickel for this reaction. Dissert. Abstr.

N80-13621*# Silicon Technology Corp., Oakland, N. J.
DEVELOPMENT OF METHODS OF PRODUCING LARGE AREAS OF SILICON SHEET BY THE SLICING OF SILICON INGOTS USING INSIDE DIAMETER (I.D.) SAWS Quarterly Report, 1 May - Jun. 1979
Peter Aharonyan 1979 24 p Sponsored in part by DOE
(NASA-CR-162520; QR-1) Avail: NTIS HC A02/MF A01 CSCL 10A

Methods of producing large areas of silicon sheets were developed by using inside diameter (I.D.) saws to slice silicon ingots. A 16 inch automated I.D. slicing machine was modified to accept programmable electric feed system, a crystal rotating system and a dyna-track blade monitoring and control system. The saw and accessories were used to slice 75 mm diameter single crystal silicon ingots while rotating them. The automated saw automatically recovered the wafers and loaded them into a cassette. The amount of material lost during slicing was reduced by using smaller blades than ones normally used to slice the wafers. Slicing runs on 100 mm diameter silicon is the next goal. R.E.S.

N80-13622*# TRW Defense and Space Systems Group, Redondo Beach, Calif.
PEP SOLAR ARRAY DEFINITION STUDY Final Programmatic Report
30 Oct. 1979 82 p refs
(Contract NAS9-15870)
(NASA-CR-160398; TRW-35515-6002-RU-00) Avail: NTIS HC A05/MF A01 CSCL 10A

The power extension package (PEP) is a solar array system that will be used on the space transportation system to agument the power of the Orbiter vehicle and to extend the time the vehicle may stay in orbit. The baseline configuration of the PEP is reviewed. The programmatic aspects of the design covering the development plan, the manufacturing facility plan and the estimated costs and risks are presented. R.E.S.

N80-13623*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MODIFIED POWER LAW EQUATIONS FOR VERTICAL WIND PROFILES
D. A. Spera and T. R. Richards 1979 13 p refs Presented

at the Wind Characteristics and Wind Energy Siting Conf., Portland, Oreg., 19-21 Jun. 1979 Sponsored by DOE, American Meteorological Soc., Pacific Northwest Lab.
(E(49-26)-1059)
(NASA-TM-79275; DOE/NASA/1059-79/4) Avail: NTIS HC A02/MF A01 CSCL 10A

Equations are presented for calculating power law exponents from wind speed and surface roughness data. Results are evaluated by comparison with wind profile data measured at a variety of sites. Author

N80-13624*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LOW NO(X) HEAVY FUEL COMBUSTOR PROGRAM
Eric Lister (DOE, Germantown, Md.), Richard W. Niedzwiecki, and Lester Nichols [1979] 15 p To be presented at 25th Ann. Intern. Gas Turbine Conf., New Orleans, 9-13 Mar. 1980; sponsored by ASME
(Contract EC-77-A-31-1062)
(NASA-TM-79313; E-269; DOE/NASA/1062-79/3) Avail: NTIS HC A02/MF A01 CSCL 10B

The 'low nitrogen oxides heavy fuel combustor' program is described. Main program objectives are to generate and demonstrate the technology required to develop durable gas turbine combustors for utility and industrial applications, which are capable of sustained, environmentally acceptable operation with minimally processed petroleum residual fuels. The program will focus on 'dry' reductions of oxides of nitrogen, improved combustor durability, and satisfactory combustion of minimally processed petroleum residual fuels. Other technology advancements sought include: fuel flexibility for operation with petroleum distillates, blends of petroleum distillates and residual fuels, and synfuels (fuel oils derived from coal or shale); acceptable exhaust emissions of carbon monoxide, unburned hydrocarbons, sulfur oxides and smoke; and retrofit capability to existing engines. R.E.S.

N80-13625# Engelhard Minerals and Chemicals Corp., Edison, N. J. Research and Development Dept.
DESIGN AND DEVELOPMENT OF A 30 WATT SOLID POLYMER ELECTROLYTE FUEL CELL POWER SOURCE FUELED WITH CALCIUM HYDRIDE Final Technical Report
O. Adlhart 12 Dec. 1978 26 p
(Contract DAAK70-77-C-0222)
(AD-A071157) Avail: NTIS HC A03/MF A01 CSCL 10/2

In recent years MERDCOM has shown renewed interest in the Solid Polymer Electrolyte Hydrogen-Air Fuel Cell. It focuses on the broad spectrum of applications where power requirements are quite small ranging from fractions of a watt to a few hundred watts. Handling simplicity and versatility are of utmost importance in this power range. The SPE cell is uniquely suited. It is operative at ambient temperatures, is rugged and has excellent life characteristics. Combined with a solid hydrogen source such as calcium hydride or magnesium, high energy densities are attainable. A 24 volt, 30 watt device was developed under the contract consisting of a static SPE stack integrated with a hydrogen generator utilizing cartridge contained calcium hydride. Even in short missions of a few hours energy densities are well in excess of those obtained with secondary batteries. GRA

N80-13626# Atomics International Div., Golden, Colo.
CO-SPUTTERING OF ALUMINUM-SILVER ALLOY MIRRORS FOR SOLAR REFLECTORS
R. O. Adams, C. W. Nordin, F. J. Fraikor, and K. D. Masterson 1979 12 p refs Presented at Intern. Conf. on Met. Coatings, San Diego, Calif., 23 Apr. 1979
(Contract EY-76-C-04-3533)
(RFP-2896; CONF-790442-1) Avail: NTIS HC A02/MF A01

Films of aluminium-silver alloys of various compositions were produced for evaluation as solar reflectors are reported. Substrates were produced coated with aluminium and silver varying in composition from one end to the other. The films were characterized metallographically and compositionally, then the reflectivity and corrosion problems were determined. DOE

N80-13627# Idaho National Engineering Lab., Idaho Falls.
ANALYSIS OF BINARY THERMODYNAMIC CYCLES FOR A MODERATELY LOW-TEMPERATURE GEOTHERMAL RESOURCE
O. J. Demuth Jul. 1979 105 p refs
(Contract EY-76-C-07-1570)
(TREE-1365) Avail: NTIS HC A06/MF A01

Cycles were screened which included isobutane, pentane, cis-2-butene, and several mixed-hydrocarbon working fluids. Dual-and triple-boiling cycles were analyzed. Both shell-and-tube and direct-contact boilers, heaters, and condensers were assessed. A geothermal fluid (geo-fluid), typical of Raft River resource conditions was assumed, which has a temperature of 290 F and 52 parts per million dissolved nitrogen. Special emphasis in the analyses was directed toward investigation of several methods for keeping the loss of working fluid for the cycle at an acceptable level. It was concluded that for the Raft River geo-fluid, the direct-contact cycle has a potential for net geo-fluid utilization effectiveness values, (watt-hr/lbm geo-fluid) equivalent to those of the shell-and-tube cycle. Because of the lower cost of direct-contact components, a potential exists for the direct-contact plant to produce lower cost electrical energy than a comparable shell-and-tube plant. DOE

N80-13628# General Electric Co., Schenectady, N. Y. Electric Utility Systems Engineering Dept.
REQUIREMENTS ASSESSMENT OF WIND POWER PLANTS IN ELECTRIC UTILITY SYSTEMS. VOLUME 3: APPENDIXES Final Report
W. D. Marsh Jan. 1979 95 p refs Sponsored by Elec. Power Res. Inst.
(EPRI-ER-978-Vol-3) Avail: NTIS HC A05/MF A01

A rational approach to the consideration of wind power plants applied to electric utility systems was developed. Then a requirements assessment and preliminary impact and penetration analyses were performed by studying wind generation in three actual utility systems. Conventional utility loss-of-load probability and production simulation methods were used together with a wind turbine generator performance model developed for the study. Evaluations were based on comparison of total utility generation system costs with and without wind plants, and were expressed in terms of wind power plant value and cost. (Value is measured by the value of displaced energy and capacity of conventional power plants. Cost consists of the capital, and operating and maintenance costs of the wind plant.) DOE

N80-13629# Argonne National Lab., Ill.
WORLD ENERGY DATA SYSTEM (WENDS). VOLUME 7: NUCLEAR FACILITY PROFILES, AG-CH
Jun. 1979 254 p
(Contract W-31-109-eng-38)
(ANL-PMS-79-2-Vol-7) Avail: NTIS HC A12/MF A01

Capsule summaries of pertinent facts regarding nuclear facilities are presented. The facilities described include the entire fuel cycle from resource recovery to waste management. Power plants and all U.S. facilities are excluded. DOE

N80-13630# Argonne National Lab., Ill.
WORLD ENERGY DATA SYSTEM (WENDS). VOLUME 8: NUCLEAR FACILITY PROFILES, CO-HU
Jun. 1979 234 p refs
(Contract W-31-109-eng-38)
(ANL-PMS-79-2-Vol-8) Avail: NTIS HC A11/MF A01

Pertinent facts regarding nuclear facilities are summarized. The entire fuel cycle from resource recovery through waste management is covered. The profiles are ordered by country name, and then by facility code. DOE

N80-13631# Oak Ridge National Lab., Tenn.
LOW-TEMPERATURE THERMAL ENERGY STORAGE PROGRAM ANNUAL OPERATING PLAN
D. M. Eissenberg and H. W. Hoffman Aug. 1979 65 p refs
(Contract W-7405-eng-26)
(ORNL/TM-6934) Avail: NTIS HC A04/MF A01

The development of technologies for storing thermal energy as low temperature sensible or latent heat is considered along with cost effective systems for collecting, storing, and discharging low thermal energy, which will have significant national impact on energy conservation in the near- and mid-term. Emphasis is placed on, seasonal thermal storage, and recovery and reuse of

waste heat. Fiscal data are summarized according to thrust area, individual efforts, and funding source. R.C.T.

N80-13632# Brookhaven National Lab., Upton, N. Y.
HYDROGEN-HALOGEN ENERGY STORAGE SYSTEM
J. McBreen, S. Srinivasan, F. J. Salzano, and A. H. Beaufrere Sep. 1978 60 p refs
(Contract EY-76-C-02-0016)
(BNL-50924) Avail: NTIS HC A04/MF A01

Electrochemical investigations, materials studies, and technoeconomic assessment were performed on the electrochemically regenerative hydrogen-chlorine energy storage system. Electrochemical studies confirmed the reversibility of the cell reactions and the possibility of using the same cell in the electrolysis and fuel cell mode. A detailed heat and mass balance analysis was carried out for the H2/Cl2 system for one method of reactant storage and two schemes of heat exchange between the hydrochloric acid storage subsystem and the reactant storage subsystems. Nafion membranes in H2/Cl2 cell were characterized. From a cost comparison on a 20 MW/200 MWh electrochemically regenerative hydrogen-halogen system it was concluded that the use of either chlorine or bromine or alternative methods of chlorine storage had an insignificant effect on the overall cost of the system. The most cost effective method of hydrogen storage is very dependent on the cost activated metal hydrides. DOE

N80-13633# Planco, Inc., Dallas, Tex.
SURVEY OF THE RESEARCH INTO ENERGY-ECONOMY INTERACTIONS. VOLUME 1: SURVEY
R. Coates, D. Hanson, S. Juenger, and J. Kennington Apr. 1979 248 p refs
(Contract EI-78-C-01-6346)
(HCP/I6346-01-1-Vol-1) Avail: NTIS HC A11/MF A01

A detailed and comprehensive review of recent (1960 to present) and on-going research into energy-economy interactions is presented. The results form theoretical and empirical analyses of energy-macroeconomics interactions, the different methodologies used, and the conceptual problems in this research are emphasized. The supply of energy, the price of energy, the world price of oil, energy capital requirements, energy R and D, conservation regulations, and stockpiling are among the variables studied. A conceptual framework for analyzing energy-economy models, the general features and methodologies of a large number of models, and the state of the art in modeling energy-economy interactions are included. Six different energy-economy models: Manne's ETA-MACRO and ETA, Hudson-Jorgenson's LITM, PILOT, Wharton Annual Energy, Reister-Edmonds, and Berkeley (Giassey-Benenson) are reviewed. Each review describes the methodology and general features embodied in the model, summarizes the types of energy-economy interactions addressed, and assesses the capabilities of the model. DOE

N80-13634# Los Alamos Scientific Lab., N. Mex.
ENERGY POLICY AND DECISION ANALYSIS; NEW CONCEPTS AND MECHANISMS
E. L. Kaufman and R. W. Vogel Jul. 1979 52 p refs
(Contract W-7405-eng-36)
(LA-7909-MS) Avail: NTIS HC A04/MF A01

Relevant portions of the energy-management problem and a technique wherein objective energy policy analysis can be performed in a short time frame are described. A precept for decision criteria is proposed and a set of fundamental concepts are described that allow quantitative assessment of policy and decision consequences for the total energy system. A decision conferencing is described wherein the technical assessment is combined with the political acumen of experienced decision makers to allow the best public-interest choice to be made. A rationale is also presented for the organizational placement of the analysis function, outside of government or industry. This placement provides a much needed level of credibility, higher than that which presently exists, and reduces bias and equitably balance the needs of the public, government, and industry. DOE

N80-13635# Midwest Research Inst., Golden, Colo.
SOLAR ENERGY PERSPECTIVES FOR PUBLIC POWER
N. H. Woodley Jun. 1979 22 p refs Presented at Am. Public Power Assoc., 1979 Natl. Conf., Seattle, 19 Jun. 1979
(Contract EG-77-C-01-4042)
(SERI/TP-35-300; CONF-790685-1) Avail: NTIS HC A02/MF A01

Perspectives on the utilization of solar energy for electricity production and thermal energy utilization by the public are briefly summarized. Wind energy conversion, biomass conversion, solar thermal, OTEC, photovoltaics, and solar heating and cooling are discussed. DOE

N80-13636# Argonne National Lab., Ill.
ASSESSMENT OF STIRLING ENGINE POTENTIAL IN TOTAL AND INTEGRATED ENERGY SYSTEMS
T. J. Marciniak, J. C. Bratis, A. Davis, and C. Lee Feb. 1979 167 p refs
(Contract W-31-109-eng-38)
(ANL/ES-76) Avail: NTIS HC A08/MF A01

The advantages and disadvantages of large Stirling engines in total, or integrated, energy systems are discussed and the performance and cost characteristics of such engines are analyzed and compared with the main competitors (diesel engines and gas turbines) for such applications. The comparisons are made through simplified and detailed systems analyses. The requirements for the development of a large Stirling engine are outlined along with a suggested developmental program based on the systems studied and intercomparisons of competing technologies. Results indicate that, given the attributes of the competing technologies involved, the main advantage of the Stirling engine lies in its ability to use fuels other than distillates. This attribute must be developed further in order to provide engine technologies which can burn abundant fuels such as coal or coal-derived fuels. The potentially high efficiency of Stirlings would be especially advantageous in applications where a high electrical-to-thermal energy demand ratio exists. DOE

N80-13637# Department of Energy, Washington, D. C. Div. of Electric Energy Systems.
SYSTEMS ENGINEERING FOR POWER, PROGRAM REPORT
Jun. 1979 372 p
(DOE/ET-0012/2-Rev) Avail: NTIS HC A16/MF A01

The development of the conceptual tools needed for the planning, engineering, and operation of the electric energy systems of the future is discussed. Three areas of increased complexity in the electric energy field are addressed. They are the increasing degree of interconnection between operating areas, the development of new technologies, and a continual tightening of the constraints within which the electric energy system must operate, including financial, environmental and conservation constraints. Each of these driving forces has implication for system operation (control) and for system design (planning). The subprograms which have thus far been developed for control and planning are defined. DOE

N80-13638# California Univ., Livermore. Lawrence Livermore Lab.
ENERGY SYSTEM IN THE FAR WEST: IMPACTS OF THE NATIONAL ENERGY ACT OF 1978
B. Hammond (California Univ., Berkeley), T. Bradshaw (California Univ., Berkeley), and D. Dorn 6 Apr. 1979 46 p refs
(Contract W-7405-eng-48)
(UCRL-52754) Avail: NTIS HC A03/MF A01

The impact of the National Energy Act of 1978 (NEA) on state energy systems in Federal Region IX (Arizona, California, Hawaii, and Nevada) is discussed. Data on the demographic and economic character of the region are presented along with an overview of the impact of the NEA on each energy industry in the region. The act's impact on interstate linkages and the reliability of energy supplies is also assessed. It is concluded that the NEA will serve to encourage actions already being taken by many of the utilities, but that it will not effect major changes in existing patterns of energy use. DOE

N80-13639# Oak Ridge National Lab., Tenn. Computer Science Div.
MATHEMATICAL MODELING OF PHASE CHANGE PROCESSES FOR LATENT HEAT THERMAL ENERGY STORAGE
A. D. Solomon Aug. 1979 137 p refs
(Contract W-7405-eng-26)

(ORNL/CSD-39) Avail: NTIS HC A07/MF A01

Some aspects of heat transfer and thermal energy storage are reviewed and then a liquid-solid phase change model without boundary conditions whose temperature distribution and phase boundary history can be found explicitly is examined. Phase change processes with boundary conditions are also discussed along with their approximate or exact solutions. Methods of finding elementary bounds on the components of simple phase change problems are given. A numerical method is presented for the case where the densities of the solid and liquid phases are not necessarily equal. K.L.

N80-13640# Sandia Labs., Albuquerque, N. Mex. Applied Mechanics Div.

RECENT SPIN TEST OF TWO COMPOSITE WAGON WHEEL FLYWHEELS

A. K. Miller 1979 12 p refs

(Contract EY-76-C-04-0789)

(SAND-79-1669C) Avail: NTIS HC A02/MF A01

The dynamic behavior of two structurally dissimilar flywheels was compared. In one design, the graphite/epoxy rim was attached to the aluminum hub with twenty-four thin Kevlar-49/epoxy spokes, while in the other design eight thicker graphite/epoxy spokes connected the rim to the hub. Horizontal disturbances of the flywheel hub were detected for speeds less than approximately 6,000 rpm. These disturbances are believed to be associated with predicted modes of vibration for the flywheel-spin-turbine system. No modes of vibration were sensed for the predicted possible whirl and torsional resonances in the speed range between 6,000 rpm and 22,000 rpm. A squeeze film damper assembly successfully stabilized the flywheel-spin-turbine system when the damper functioned properly; however, low frequency retrograde instabilities were induced into the system by the damper assembly when it was not operated within prescribed parameters. DOE

N80-13641# Argonne National Lab., Ill.

HEAT TRANSFER IN LEAD-ACID BATTERIES

K. W. Choi and N. P. Yao 1978 11 p refs Presented at 2nd AIAA/ASME Thermophys. and Heat Transfer Conf., Palo Alto, Calif., 24 Sep. 1978

(Contract W-31-109-eng-38)

(CONF-7809102-1) Avail: NTIS HC A02/MF A01

Mathematical analysis was carried out for the heat transfer in lead-acid batteries designed for use in electric vehicles. Results indicate that the heat generated in the battery during recharge cycles may cause a noticeable rise of battery temperature in the absence of proper thermal management. Electrolyte circulation along the battery plates is found to be the most effective in removing heat and providing a uniform temperature field. Numerical solutions are provided for the engineering evaluation of heat-removal design during battery cycling processes. DOE

N80-13642# Sandia Labs., Albuquerque, N. Mex.

SOLAR THERMAL TEST FACILITY HELIOSTAT DEVELOPMENT

D. E. Arvizu Jun. 1979 57 p refs Presented at Intern. Symp. on Concentrating Solar Collector Technol., Albuquerque, N. Mex., 14 Jun. 1978

(Contract EY-76-C-04-0789)

(SAND-78-1177; CONF-7806153-1) Avail: NTIS HC A04/MF A01

The STTF heliostat system is described, and performance data are discussed. The STTF, which uses an array of 222 heliostats in a north field configuration, is capable of supplying 5 MWth energy onto a target on the tower. DOE

N80-13643# California Univ., San Diego.

NATIONAL ENERGY POLICY AND STATE COASTAL PROGRAMS: A CRITIQUE OF CURRENT EFFORTS TO BALANCE ENVIRONMENTAL PROTECTION AND ENERGY PRODUCTION ALONG THE COAST

R. Kanouse and J. Sorensen Apr. 1979 394 p refs

(Contract EY-76-S-03-0034)

(SAN-0034/263-1) Avail: NTIS HC A17/MF A01

Modifications to the Coastal Zone Management Act (CZMA) are proposed. The first four modifications clarify key provisions in the current Act. The latter four modifications focus upon attributes of the energy facility siting regulatory process that are either ignored or inadequately addressed in the current CZMA. These four proposed modifications are designed to minimize the impediments to an effective and efficient siting process that are caused by the inherent complexities of national energy policy and environmental protection programs. Two legislative options for amending the CZMA, both of which incorporate the eight suggested modifications, are proposed. DOE

N80-13644# Boeing Engineering and Construction, Seattle, Wash.

LINEAR CONCENTRATION SOLAR COLLECTOR IN AN AIR SUPPORTED ENCLOSURE. PRELIMINARY DESIGN STUDY Final Report

J. H. Laasko and D. K. Zimmerman Mar. 1979 96 p refs

(Contract EY-76-C-04-0789)

(SAND-78-7022) Avail: NTIS HC A05/MF A01

A preliminary design for a low cost linear parabolic concentrating solar collector in a pneumatically stabilized cylindrical plastic film enclosure is described. The collector configuration structural analyses, thermal performance modeling, mass-produced component costs, field assembly methods and maintenance requirements are discussed. Daily efficiencies in excess of 45% are predicted with estimated installed field collector costs of $90/sq m ($8.34/sq ft). Results of cost and performance studies indicate that the collector has potential for low cost and offers attractive cost/performance figures-of-merit with further development. DOE

N80-13645# Sandia Labs., Albuquerque, N. Mex.

PERFORMANCE TESTING OF THE GENERAL ELECTRIC ENGINEERING PROTOTYPE COLLECTOR

V. E. Dudley and V. E. Workhoven Jul. 1979 35 p refs

(Contract EY-76-C-04-0789)

(SAND-79-0514) Avail: NTIS HC A03/MF A01

The performance of a 5 meter parabolic dish solar concentrator was characterized. Thermal efficiency and thermal losses were investigated at temperatures from 100 C to 300 C. Significant improvements were made in the performance of the collector during the test cycle. Final efficiency performance ranged from about 60% at 100 C to about 53% at 300 C. Thermal losses varied significantly with changes in wind velocity. R.E.S.

N80-13646# United Technologies Corp., South Windsor, Conn. Power Systems Div.

INTEGRAL CELL SCALE-UP AND PERFORMANCE VERIFICATION Final Report

L. M. Handley, W. E. Houghby, W. H. Johnson, T. G. Schiller, and H. Y. Stryker Jun. 1979 57 p ref Sponsored by Elec. Power Res. Inst.

(EPRI-EM-1134) Avail: NTIS HC A04/MF A01

The integral cell configuration of the 4.8-MW demonstrator cell size was scaled and the full size packages were tested in short cell stacks to verify the acid management capability and document performance. Low cost cell stack construction techniques were refined, and materials were modified to produce improved cell stack components. A 1530-hour test of a 20-cell stack demonstrated that the performance of the integral cell configuration was equivalent to that of the 4.8-MW demonstrator configuration, and that increased acid inventories could be accommodated in the electrodes without severe performance penalties. Improvements in acid cell stack technology that would be sufficient to allow a 20 percent reduction in total active cell area relative to the demonstrator were investigated. Improvements to previously developed catalysts, catalyst layers, and application techniques were investigated, and subscale single cell endurance tests were conducted. A cell stack conceptual design incorporating the integral cell concept was initiated. DOE

N80-13647# California Univ., Livermore. Lawrence Livermore Lab.

TIDAL PRESSURE RESPONSE AS A RESERVOIR ENGINEERING TOOL

J. M. Hanson Jul. 1979 5 p refs Presented at Geothermal Resources Council Ann. Meeting, Reno, Nev., 24 Sep. 1979

(Contract W-7405-eng-48)

(UCRL-83012; CONF-790906-10) Avail: NTIS HC A02/MF A01

Fluid pressure oscillations resulting from tidal strain reflect

hydrologic and elastic properties of a reservoir. Precise measurement and interpretation of these pressure fluctuations has the potential of being a useful quantitative reservoir engineering tool. A procedure was developed that quantifies the spectral resolution in terms of an absolute confidence level in both amplitude and phase of the spectral estimate. Analysis of one week of data from a well in the Salton Sea is presented. DOE

N80-13648# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
CHARACTERIZATION OF SOLID-WASTE CONVERSION AND COGENERATION SYSTEMS
Ronald L. Ritschard, Kendall F. Haven, Mark Henriquez, Josh Kay, and William Walzer 15 Aug. 1978 226 p refs
(Contract W-7405-eng-48)
(LBL-7883) Avail: NTIS HC A11/MF A01

Three basic technologies for recovering energy from municipal solid wastes (MSW) are considered: (1) direct combustion using a waterwall incinerator in which heat from burning refuse is converted to steam by circulating water in steel tubes jacketing the interior of the incinerator; (2) manufacture of a relatively uniform shredded, pulverized, or pelleted refuse derived fuel for supplemental firing in a utility boiler; and (3) pyrolysis or destructive distillation of MSW to extract a low Btu fuel gas. End use applications of cogeneration systems include fluidized bed systems for use in the pulp and paper industry; diesel systems using the digested sewage gas of a sewage treatment plant for electricity generation, heating and pumping; and an enhanced oil recovery system. Comparisons are made of Landguard pyrolysis, Garrett flash pyrolysis, Union Carbide Purox process, direct combustion, refuse derived fuels, fluidized bed cogeneration, diesel cogeneration, and enhanced oil recovery. DOE

N80-13649# Midwest Research Inst., Golden, Colo.
REVIEW OF THE ENVIRONMENT EFFECTS AND BENEFITS OF SELECTED SOLAR ENERGY TECHNOLOGIES
Kathryn A. Lawrence May 1979 18 p refs
(Contract EG-77-C-01-4042)
(SERI/TP-53-114R) Avail: NTIS HC A02/MF A01

The environmental effects of photovoltaic cells, wind energy conversion (WEC), and the solar thermal central receiver are reviewed and summarized. The solar energy technologies are assumed to be deployed as centralized energy production facilities. The phase of resource extraction and component production is the most environmentally hazardous. Impacts of plant construction will be somewhat site specific but should approximate impacts associated with any large construction activity. The operation phase is relatively environmentally benign. The WEC operation produces low level noise pollution and presents minimal hazards to flying species. Solar thermal facilities equipped with wet cooling towers may affect local air quality via cooling tower drift. In addition, large installations of each option may alter local microclimate. Decommission of WEC, solar thermal, and photovoltaic facilities should prevent no environmental hazards, although disposal of CdS or GaAs cells will require care. DOE

N80-13650# Brookhaven National Lab., Upton, N. Y.
PROCESS OPTIMIZATION OF INDUSTRIAL ENERGY USE
D. A. Pilati and F. T. Sparrow (Purdue Univ.) 1979 7 p refs Presented at the Intern. Conf. on Energy Use Management, ICEUM-2, Los Angeles, 22-26 Oct. 1979 Submitted for publication
(Contract EY-76-C-02-0016)
(BNL-26482; CONF-791009-3) Avail: NTIS HC A02/MF A01

A set of industry-specific process optimization models are developed. These models are to be used for energy use projections, energy policy analyses, and process technology assessments. Applications of the models currently under development show that: (1) system wide energy impacts may be very different from engineering estimates; (2) selected conservation strategies may have the perverse effect of increasing energy use; and (3) a proper combination of energy taxes and investment tax credits is more socially desirable than either policy alone. DOE

N80-13651# Brookhaven National Lab., Upton, N. Y.
CASE STUDY OF THE BROWNELL LOW ENERGY REQUIREMENT HOUSE
R. F. Jones, R. F. Krajewski, and G. Dennehy May 1979 78 p refs
(Contract EY-76-C-02-0016)
(BNL-50968) Avail: NTIS HC A05/MF A01

The design and thermal performance of an innovative house built in 1977 in the Adirondacks area of New York State was evaluated. The house has a very tight and well-insulated envelope, with the rigid insulation board applied to the outside of the frame. Passive solar gain through south-facing glass, along with internal free sources of heat, are shown to provide a substantial part of the building's heating requirements. Effective integral thermal storage, provided by the exposed interior structure, serves to keep interior temperature excursions within acceptable limits. Additional remote storage is provided in the form of a large thermal storage sand bed, with air ducts, located below the basement floor. Calculations and measured performance data show that the house's space heating needs are only about 40 percent of those of a similar size house built to minimum property standards, and less than 25 percent of those of a typical inventory house in the Northeast United States. DOE

N80-13652# General Electric Co., Schenectady, N. Y. Corporate Research and Development Dept.
APPLICATION OF INERTIA WELDING TECHNOLOGY TO STEEL DISC-TYPE FLYWHEELS Final Report
29 Jun. 1979 79 p
(Contract W-7405-eng-48)
(UCRL-15045) Avail: NTIS HC A05/MF A01

The feasibility of applying inertia welding to the fabrication of steel flywheel assemblies for transportation application was investigated. In the inertia welding process, the weld is accomplished by friction and pressure. The parts are literally spun together. The inertia welding characteristics of three steel alloys (Hy-Tuf, 4340, and D6AC) were determined by welding both solid bars (1 in. OD) and tubular specimens (2 in. OD by 0.1 in. thick wall). In addition, characteristics of the weld and the weld flash (that material extruded from the weld mating surfaces during the welding process) were evaluated. Results indicated Hy-Tuf and 4340 have good welding characteristics, while D6AC is questionable. DOE

N80-13653# Los Alamos Scientific Lab., N. Mex.
ENERGY PLANNING WITH SOLAR AND CONSERVATIONS: INDIVIDUAL VALUES AND COMMUNITY CHOICE
S. A. Noll, F. Roach, and L. Palmiter 1979 6 p refs Presented at Intern. Solar Energy Soc. Meeting, Atlanta, 28 May 1979
(Contract W-7405-eng-36)
(LA-UR-79-1599; CONF-790541-24) Avail: NTIS HC A02/MF A01

Conflict among the priorities of individuals, private sector businesses, and government entities involving the transition to a renewable energy-resource base is considered. These conflicts are intensified by the overwhelming number of externalities created by the actions of each of these decision making groups. An illustrative example of the benefits to be derived from community energy planning is given. It is shown that community energy programs have the potential to stimulate household and community income, create job opportunities, develop a more resilient energy economy, and help mitigate environmental deterioration. DOE

N80-13654# Brookhaven National Lab., Upton, N. Y.
DESIGN, CONSTRUCTION, AND OPERATION OF THE SOLAR ASSISTED HEAT PUMP GROUND COUPLED STORAGE EXPERIMENTS AT BROOKHAVEN NATIONAL LABORATORY
P. D. Metz 1979 8 p refs Presented at the 4th Ann. Heat Pump Technol. Conf., Stillwater, Okla., 9 Apr. 1979
(Contract EY-76-C-02-0016)
(BNL-25908; CONF-790446-3) Avail: NTIS HC A05/MF A01

The design, construction, and initial operation of the first generation experiments are discussed. Four of these experiments involve buried tanks, and four use buried serpentine coils of 1 1/2 inch diameter flexible polyethylene pipe in various configurations and lengths. Heat is added to or removed from each experiment by hot water heaters or heat pumps. The amount of heat added or removed is determined by a computer

program which simulates all parts of the solar system except for the ground coupling device. Experiments conducted to determine ground thermal conductivity, heat capacity, diffusivity, and moisture content are also discussed. The overall research program plan and some early results are presented. DOE

N80-13655# Rosenblatt (M.) and Son, Inc., New York.
OTEC PLATFORM CONFIGURATION AND INTEGRATION. VOLUME 1: SYSTEMS ENGINEERING AND INTEGRATION Final Report
7 Jul. 1978 228 p refs
(Contract EG-77-C-01-4065)
(TID-29418) Avail: NTIS HC A11/MF A01

An evaluation methodology was developed for the purpose of analyzing the ocean system requirements against the site criteria and in arriving at the conclusions as far as hull, seawater system, positioning system, and other ocean systems characteristics. Feasibility studies and cold water pipe/hull stress analyses indicated that the best platform hull shape would be one that would have a submerged main body and the cold water pipe would be attached to it in a flexible joint type configuration, possibly with flexible joints along the length as well. The best positioning system would be a static mooring system, possibly 3-leg, using hollow cylindrical links for lines. DOE

N80-13656# Ocean Data Systems, Inc., Monterey, Calif.
OTEC THERMAL RESPONSE REPORT FOR PACIFIC PLANT SHIP, 5 TO 10 DEG N 90 TO 95 DEG W
W. A. Wolff May 1979 44 p refs
(Contract ET-78-C-01-2898)
(HCP/T2898-01/3) Avail: NTIS HC A03/MF A01

The temperature difference resource for the plant ship region between 5 to 10 North latitude and 90 to 95 West longitude is evaluated for potential OTEC use. Surface temperatures are consistently high with the monthly mean temperatures ranging from 26.5 C to 28.5 C. An annual mean delta T greater than 20 C is available at 550 meters. Bottom depths are much greater than 1500 meters for the entire plant ship region. The mixed layer depth is very shallow throughout the year, and may be nonexistent at times indicating a warm water intake near the surface. High winds and storms are not a major problem for this site, due in part to the proximity to the equator. Mean surface currents are somewhat larger in magnitude than other Pacific sites. The site chosen is located near the approximate limits of the North Equatorial Current and the Pacific Equatorial Countercurrent. Current shear may cause problems. DOE

N80-13657# Lockheed Missiles and Space Co., Sunnyvale, Calif.
OTEC SYSTEM RESPONSE AND CONTROL ANALYSIS
W. L. Owens 1979 7 p Presented at the 6th OTEC Conf., Washington, D.C., 19 Jun. 1979
(Contract ET-78-C-01-3407)
(CONF-790631-2) Avail: NTIS HC A02/MF A01

A mathematical model to analyze the system response along with response to changes in operating conditions is developed. Lumped conditions for line and heat exchanger vapor volumes and heat exchanger temperatures are assumed in the model. Examples are presented which calculate the appropriate time derivatives for the various system elements and provide the interaction between the various components when subjected to changes in the important forcing functions such as generator load, seawater flow, or temperature variations. Typical response curves are presented for pressures, temperatures, mass flow rates, and generator speed for an OTEC plant scheduled for operation. A.W.H.

N80-13658# Department of Energy, Washington, D. C. Energy Storage Systems Div.
MULTI-YEAR PLAN FOR THERMAL AND MECHANICAL ENERGY STORAGE PROGRAM
Jun. 1979 79 p refs
(DOE/ET-0109) Avail: NTIS HC A05/MF A01

Reliable, efficient, and inexpensive energy storage technologies to support other DOE end-use divisions in their substitution and energy-savings missions are discussed. In addition to thermal and mechanical technology development, the Technical and Economic Analysis subprogram which supports both the Thermal and Mechanical Storage Program and the Electrochemical (Battery) Storage Program is described. The DOE end-use organizations that benefit from development of thermal and mechanical storage technologies are: Central Solar Technology, Distributed Solar Technology, Solar Applications, Transportation Programs, Buildings and Community Systems, Industrial Energy Conservation, and Resource Applications. DOE

N80-13659# Gould, Inc., Rolling Meadows, Ill.
ASSESSMENT OF TECHNICAL AND ECONOMIC FEASIBILITY OF ZINC/BROMINE BATTERIES FOR UTILITY LOAD LEVELING Final Report
R. A. Putt May 1979 256 p refs Sponsored by Elec. Power Res. Inst.
(EPRI-EM-1059) Avail: NTIS HC A12/MF A01

The viability of zinc/bromine batteries for utility load leveling applications is examined. Comparisons of bromine and chlorine as positive reactants in flowing electrolyte cells are presented and discussed in relation to storing bromine, minimizing self discharge, controlling zinc dendrites, and developing a cost effective cell design. The development of the system components, testing of the cells and batteries, and a design and cost study of a 100 MWh battery are discussed. DOE

N80-13660# Aerojet Energy Conservation Co., Sacramento, Calif.
MULTI-USE GEOTHERMAL ENERGY SYSTEM WITH AUGMENTATION FOR ENHANCED UTILIZATION. NON-ELECTRIC APPLICATION OF GEOTHERMAL ENERGY IN SUSANVILLE, CALIFORNIA Final Report
G. K. Olsonn, D. L. Benner-Drury, and G. R. Cunnington Feb. 1979 200 p refs
(Contract ET-78-C-03-1740)
(DOE/ET-248447/1) Avail: NTIS HC A09/MF A01

Multi-use, augmented geothermal space/water heating and cooling systems were studied. The overall benefits in both the public and private sectors, of using low temperature (150 F to 240 F) geothermal resources are explored. Options considered, alone and in combination, include heat pumps, fossil-fuel peaking, user load balancing, and cascading from the geothermal system serving the public buildings into a private Park of Commerce development. A range of well temperatures, depths, flow rates, and drilling costs are considered to provide system cost sensitivites. A planned development is emphasized for ease of financing and expansion. A preliminary design of Phase A of a Susanville Public Building Energy System and a conceptual design of an integrated Park of Commerce, Phase 1, are included. This system was designed for a 150 F resource and can be used as a model for other communities with similar resource temperatures. DOE

N80-13661# Research Triangle Inst., Research Triangle Park, N. C.
NOVEL CONCENTRATOR PHOTOVOLTAIC CONVERTER SYSTEM DEVELOPMENT Final Report
S. M. Bedair, M. F. Lamorte, and J. R. Hauser Jul. 1979 207 p refs
(Contract EY-76-C-04-0789)
(SAND-79-7040) Avail: NTIS HC A10/MF A01

The development, synthesis, and evaluation of a cascade solar cell having an AM 1 conversion efficiency of 30 percent or greater and capable of operating at both high illumination levels and elevated temperatures is discussed. A comparison of the cascade solar cells with conventional single junction solar cells is presented. A number of ternary and quaternary material systems which have potential application to the cascade solar cell are discussed. Demonstration cells built in the GaAs/AlGaAs material systems are examined. A.W.H.

N80-13662# Department of Energy, Washington, D. C. Office of Solar, Geothermal, Electric and Storage Systems.
SOLAR THERMAL POWER SYSTEMS Annual Technical Progress Report, 1978
Jun. 1979 144 p refs
(DOE/ET-0078/T1) Avail: NTIS HC A07/MF A01

The development of solar thermal power system technology for midtemperature, solar total energy, small community, irrigation, and large power systems is discussed. Subsystem and component development is also described. K.L.

N80-13663# Bureau of Reclamation, Boulder City, Nev.
SOLAR THERMAL ELECTRIC PLANTS IN HYDROELECTRIC GRID Technical Progress Report, 9 Feb. - 9 May 1979
17 Jul. 1979 26 p refs
(Contract DE-AI03-79SF-10505)
(DOE/SF/10505-1) Avail: NTIS HC A03/MF A01

Factors to be used in candidate site selection were determined, factor maps were compiled, and the development of a hydrologic model of the river/reservoir system was initiated. In addition, initial performance and cost data were reviewed for three solar power systems. K.L.

N80-13664# Aerospace Corp., El Segundo, Calif. Information Processing Div.
SOLAR TOTAL ENERGY SYSTEMS (STES) SIMULATION PROGRAM USER'S GUIDE
B. R. Timmer 4 Jan. 1979 81 p refs
(Contract W-7405-eng-26)
(ORNL/Sub-7525/2; ATR-79(7748)-2) Avail: NTIS HC A05/MF A01

A computer program which simulates the operations of a solar total energy systems (STES) facility and evaluates its annualized costs and energy displacement is described. The program contains a dynamic model which simulates the interaction of the insulation and electrical and thermal demands on an hourly basis. The program is flexible enough to allow thousands of different configurations to be simulated under a wide variety of conditions. Moreover, with this program, the sizes of the STES components can be adjusted to maximize the return on invested capital or the savings in fossil fuels. The program can also be used to simulate conventional fossil fuel total energy systems and solar thermal energy systems for comparison with STES. DOE

N80-13665# Lincoln Lab., Mass. Inst. of Tech., Lexington.
EVALUATION OF COMBINED PHOTOVOLTAIC/THERMAL COLLECTORS
S. D. Hendrie 1979 6 p refs Presented at Intern. Solar Energy Soc. Meeting, Atlanta, 28 May 1979
(Contract EG-77-S-02-4577)
(COO-4577-8; CONF-790541-54) Avail: NTIS HC A02/MF A01

The thermal and electric performance of an air and a liquid type combined photovoltaic/thermal solar collector was evaluated, yielding close correlation with theoretical results. Maximum thermal efficiencies of 42.5% and 40% for the liquid and air collectors without electric power production decreased to 40.4% and 32.9% when electrical power were produced. Maximum electrical efficiencies of 6.8% were measured. DOE

N80-13666# Oak Ridge National Lab., Tenn.
EXPERIMENTAL AND ANALYTICAL OTEC STUDIES AT ORNL
J. W. Michel 1979 8 p refs Presented at 6th OTEC Conf., Washington, D. C., 19 Jun. 1979
(Contract W-7405-eng-26)
(CONF-790631-1) Avail: NTIS HC A02/MF A01

Ammonia condensation tests were performed on several vertical fluted tubes and on tubes inclined at 30 deg from the vertical position. The high condensation coefficients reported for fluted tubes were verified. They seemed to be insensitive to tube length over the range tested. Also, tilting the tubes significantly improved the performance of smooth tubes and caused a slight decrease in the performance of fluted tubes. The cost effectiveness of various types of heat transfer enhancement were evaluated and heat exchanger joinability was surveyed. DOE

N80-13667# Franklin Pierce Law Center, Concord, N. H. Energy Law Inst.
FUNDAMENTAL ECONOMIC ISSUES IN THE DEVELOPMENT OF SMALL-SCALE HYDRO
Peter W. Brown and M. Ringo 15 Mar. 1979 28 p
(Contract RA-23-216.00.0)
(DOE/RA-23-216.00.0-02) Avail: NTIS HC A03/MF A01

The analysis presented is based on literature reviews, case studies, on-site visits, and particularly information from the Franklin Pierce - Thayer project. Broadly stated, economic analysis to data suggests that legal and regulatory constraints are the major obstacles for the slow development of SSH development. The economic picture of a hydro site as if it were a typical small business is described. The discussion is broken down into four parts, namely: costs, supply, demand and profitability. DOE

N80-13668# Colorado State Univ., Fort Collins. Solar Energy Applications Lab.
SOLAR COOLING PERFORMANCE IN CSU SOLAR HOUSE 3
D. S. Ward, J. C. Ward, and H. S. Oberoi Jan. 1979 20 p refs
(Contract EY-76-S-02-2858)
(COO-2858-23) Avail: NTIS HC A02/MF A01

Preliminary performance and pertinent operating experience with a liquid-heating flat-plate solar collector integrated with a residential solar heating and cooling system is presented. Data for the months of July and August (1978) are included, along with an analysis of the operation of the solar cooling system which utilizes the Yazaki 2-ton lithium bromide absorption chiller and a cool storage subsystem. Results of the analysis provide clear indications of the critical importance of temperature differentials between the collector outlet and the absorption chiller generator inlet, the effects of alternative control strategies, the marginal feasibility of cool storage, the devastating effect on system performance of the heat losses from the thermal storage unit, and the importance of parasitic power requirements on the ultimate feasibility of solar absorption cooling. DOE

N80-13669# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
TECHNOLOGY DEVELOPMENT NEEDS FOR HIGH TEMPERATURE PROCESS HEAT
Robert J. Copeland Aug. 1978 62 p refs
(Contract EG-77-C-01-4042)
(SERI/TR-35-047) Avail: NTIS HC A04/MF A01

The potential utilization of high temperature solar thermal process heat was investigated. The petroleum industry was reviewed in some detail, and one candidate technology using hydrogen for energy transport was also investigated. Costs, land availability, and energy transfer were the key problem areas. With appropriate development all problems appeared solvable. More detailed evaluations of each large user industry were recommended. DOE

N80-13670# RCA Labs., Princeton, N. J.
MATERIALS FOR SOLAR THERMAL CONVERSION Final Report, 1 Sep. 1977 - 31 Aug. 1978
J. I. Gittleman and E. K. Sichel Sep. 1978 22 p refs
(Contract EG-77-C-02-4557)
(COO-4557-1; PRRL-78-CR-42) Avail: NTIS HC A02/MF A01

Composite semiconductors were produced by cosputtering Ge and Si with CaF2 and their optical constants were measured. The normal specular reflectance of films sputtered on mirrored surfaces was measured. These data were used to compute the solar absorptance alpha/sub s/ and thermal emittance epsilon/sub th/. Thus at T_c = 500 C a conversion efficiency of 50 percent is possible at solar concentration ratios C of 7 to 8, and about 70 percent is possible for C approximately 40. It was concluded that a parabolic trough, a distributed receiver with a concentration ratio of 50 or less could be more economical for some applications than a central receiver for which C > 500, but the possiblity of using these and other highly selective absorbers for the economical conversion of solar energy should be considered. DOE

N80-13671# Virginia Univ., Charlottesville.
EXPERIMENTAL AND THEORETICAL EVALUATIOM OF A NOVEL CONCENTRATING SOLAR ENERGY COLLECTION SYSTEM
Alexander B. Maish and J. Taylor Beard 1979 5 p refs Presented at the 1979 Intern. Solar Energy Congr., Atlanta, 28-30 May 1979
(Contract EY-76-C-04-0789)
(SAND-79-1053C; CONF-790541-3) Avail: NTIS HC A02/MF A01

A new concentrating solar energy system was evaluated theoretically and experimentally. The modular, two-axis tracking

collector combined an aluminized mylar reflector with a flat plate absorber. Radiation collected from the 7 sq m frontal area was concentrated by a factor of five, making the collector suitable for intermediate temperature applications. The thermal performance of the collector was determined theoretically on a digital computer using a nodal approach to model the heat transfer processes. Collector sensitivies to environmental parameters were calculated. An experimental testing program conducted according to testing standards verified the predicted results. DOE

N80-13672# Colorado State Univ., Fort Collins. Solar Energy Applications Lab.
TRANS-SEASONAL STORAGE OF SOLAR ENERGY: INNOVATIVE RESEARCH PROGRAM SUBTASK Final Report, Dec. 1977 - Sep. 1978
W. D. Kemper and W. R. Walker Oct. 1978 27 p refs
(Contract EG-77-S-02-4546)
(COO-4546-3) Avail: NTIS HC A03/MF A01

The efficiencies and economics of long term storage of solar energy as low temperature heat in shallow underground reservoirs constructed using in situ soil materials are evaluated. Simulation models for predicting the movement of water and heat in response to temperature and capillary pressure gradients in partially saturated porous media are developed and conditions which might predict the rate and extent to which dry insulating blankets of soil form around hot buried reservoirs are simulated. The effect of confining barriers which restrict vapor and liquid flow of water is also simulated. The thermal conductivities of low cost and in situ materials which may be used in the construction of underground heat reservoirs are evaluated and methods of optimizing the thermal conductivities of these materials are developed. DOE

N80-13673# Los Alamos Scientific Lab., N. Mex.
HOT DRY ROCK GEOTHERMAL ENERGY DEVELOPMENT PROGRAM Annual Report, 1978
M. C. Brown, comp., R. B. Duffield, comp., C. L. B. Siciliano, comp., and M. C. Smith, comp. Apr. 1979 132 p refs
(Contract W-7405-eng-36)
(LA-7807-HDR) Avail: NTIS HC A07/MF A01

Run segments were completed in the prototype reservoir of the energy-extraction system at Fenton Hill, New Mexico. The tests yielded significant data on system flow parameters, water loss rates, geofluid chemistry, downhole flow impedance, operational constraints, mathematical modeling, technology and instrument capabilities, and environmental effects of operation. The technical results indicated that energy (thermal or electrical) from hot dry rock may be a feasible alternate energy source. Also, plans were prepared for a system with a commercial size reservoir that can demonstrate the production lifetime of such a system. DOE

N80-13674# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
WIND ENERGY INNOVATIVE SYSTEMS Technical Status Report, Jul. 1978
Irwin E. Vas Aug. 1978 58 p refs
(Contract EG-77-C-01-4042)
(SERI/PR-13-054) Avail: NTIS HC A04/MF A01

Economic and technical feasibility of innovative concepts and systems utilizing wind energy were investigated. Technical management of the 'wind energy innovative systems' program is discussed. The efforts of the current contracts are included within four major task areas: (1) theoretical thermodynamic and aerodynamic studies; (2) model design, fabrication, and test; (3) performance projections; and (4) economic evaluations. R.E.S.

N80-13675# Power Technologies, Inc., Schenectady, N. Y.
INDUCTION AND SYNCHRONOUS MACHINES FOR VERTICAL AXIS WIND TURBINES Final Report
E. N. Hinrichsen Jun. 1979 123 p refs
(Contract EY-76-C-04-0789)
(SAND-79-7017) Avail: NTIS HC A06/MF A01

The behavior of synchronous and induction generators driven by vertical axis wind turbines is described. The merits of the two types of machines are assessed. Major advantages of the synchronous generator are reactive power control and general acceptance by utility companies. The major advantage of the induction generator is excellent damping of torque pulsations. There is no significant difference in starting ability, efficiency, or voltage ripple. DOE

N80-13676# Oak Ridge National Lab., Tenn.
LAND-BASED APPLICATION OF AN OTEC OPEN-CYCLE POWER SYSTEM
F. C. Chen 1979 6 p refs Presented at 6th OTEC Conf., Washington, D.C., 19 Jun. 1979
(Contract W-7405-eng-26)
(CONF-790631-3) Avail: NTIS HC A02/MF A01

Application of OTEC power component technology to many land-based low temperature heat resources including rejected heat from thermal plants and Federal nuclear facilities, as well as freshwater thermoclines is considered. For utilizing rejected heat from large thermal power plants where OTEC range cold water is economically available, it is more cost-effective to apply OTEC open-cycle steam turbine technology for additional turbine stages for the conventional thermal power plant cycle rather than to add a separate bottoming cycle system. For utilizing rejected heat from Federal nuclear facilities, the open-cycle power system has its advantage because it does not need isolation heat exchangers to avoid cross contamination between the working fluid and the hot water supply. A simple thermal performance model and the thermal analysis of a conceptual rejected heat open-cycle power system corresponding to binary cycle system studies are presented. DOE

N80-13677# Los Alamos Scientific Lab., N. Mex.
CONCEPTUAL DESIGNS FOR TWO REJECT HEAT SYSTEMS FOR A BRAYTON CLOSED-CYCLE CONVERTER
G. A. Bennett May 1979 32 p refs
(Contract W-7405-eng-36)
(LA-7821-MS) Avail: NTIS HC A03/MF A01

Designs for two candidate reject heat systems (RHS) developed for a Brayton closed-cycle space nuclear power system are described. The most important constraints imposed on the design are the size and mass limits and the rigid survival standard of 99% probability that the RHS be functional at full power at the end of a seven-year mission. The secondary loop design includes a pumped-NaK radiator and a heat-pipe heat exchanger. The radiator is of conventional design with armored flow tube passages and fins arranged in rectangular panels placed at right angles to each other. The heat exchanger is a cylindrical pressure vessel with four radiator loops and two converter loops. The direct-pumped gas RHS is designed with many thin-walled, finned heat pipes placed side by side to form rectangular radiator panels that are arranged at right angles to each other. The gas heat exchanger is an armored manifold composed of multiple parallel flow tubes placed at the evaporator end of the radiator heat pipes. J.M.S.

N80-13678# University of Southern California, Los Angeles. Dept. of Materials Science.
LOW COST SOLAR CELLS BASED ON AMORPHOUS SILICON ELECTRODEPOSITED FROM ORGANIC SOLVENTS Technical Quarterly Progress Report, 1 Dec. 1978 - 28 Feb. 1979
F. A. Kroeger 1979 5 p refs
(Contract EY-76-S-03-0113)
(SAN-0113-T3; TQPR-2) Avail: NTIS HC A02/MF A01

Electrodeposition studies using three possible silicon sources are reported. Improvements of the apparatus for the cathodic deposition of a-Si with the exclusion of air are discussed. Experiments are described which attempt to characterize the structure of the deposits. These include mass spectroscopy and X-ray diffraction analysis. DOE

N80-13679# Ames Lab., Iowa.
FOSSIL ENERGY PROGRAM. 1. MINING RESEARCH AND DEVELOPMENT: COAL PREPARATION AND ANALYSIS Technical Progress Report, 1 Oct. - 31 Dec. 1978
May 1979 112 p
(Contract W-7405-eng-82)
(IS-4655) Avail: NTIS HC A06/MF A01

The objectives and progress for eight areas of the fossil energy program are reported. Research topics presented include

the development of fine coal desulfurization and recovery technology, the microstructure of coal, the recovery of minerals from coal fly ash, and alloy evaluation for fossil fuel process plants. A.W.H.

N80-13680# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
THERMAL PERFORMANCE OF BUILDINGS AND BUILDING ENVELOPE SYSTEMS: AN ANNOTATED BIBLIOGRAPHY
William L. Carroll Apr. 1979 41 p Presented at the DOE/ASTM Thermal Insulation Conf., Tampa, Fla., 23-24 Oct. 1978
(Contract W-7405-eng-48)
(LBL-8925) Avail: NTIS HC A03/MF A01

A bibliography of published papers describing models, measurement techniques, apparatus, and data for the thermal performance of whole buildings and building envelope systems is presented. Summary descriptions of the content of each citation are provided. Citations on analytical models are selective and concentrate on methodology that forms the basis of computer programs for whole building energy analysis. Approached to dynamic measurements, both in the laboratory and in the field, for envelope systems and for whole buildings are included. DOE

N80-13681# Department of Energy, Oak Ridge, Tenn. Technical Information Center.
COGENERATION OPPORTUNITIES
1978 268 p refs Presented at Cogeneration Opportunities: A Symp. on Prospects for Ind. and Utility Gas, Oil and Coal-Fired Cogeneration, St. Louis, 6-7 Jun. 1978
(CONF-7806118) Avail: NTIS HC A12/MF A01

Thirteen unedited papers from a symposium covering government, industry, and utility cooperation in the use of waste energy for generating electricity and heat are presented. Specific topics discussed include process economics, institutional barriers to cogeneration, industrial cogeneration options, and utility experiences in cogeneration. K.L.

N80-13682# Argonne National Lab., Ill.
DEVELOPMENT AND EVALUATION OF MATERIALS FOR HIGH TEMPERATURE LITHIUM/SULFUR RECHARGEABLE BATTERIES
R. B. Swaroop, J. A. Smaga, and J. E. Battles Mar. 1979 29 p refs
(Contract W-31-109-eng-38)
(DOE/TIC-10098) Avail: NTIS HC A03/MF A01

Out-of-cell and in-cell tests are being conducted to identify the materials that are compatible with this cell environment. The corrosion test procedures, the nature and kinetics of the corrosion reactions, and the development and testing of electrode separators are discussed. DOE

N80-13683# Argonne National Lab., Ill.
DEVELOPMENT OF POROUS SINTERED-CERAMIC SEPARATORS FOR APPLICATION IN A Li-Al/LiCl-KCl/FeS BATTERY
G. Bandyopadhyay, J. T. Dusek, and T. M. Galvin 1979 17 p refs Presented at 4th Intern. Meeting on Modern Ceram. Tech., St. Vincent, Italy, 28 May 1979
(Contract W-31-109-eng-38)
(CONF-790526-2) Avail: NTIS HC A02/MF A01

The procedure for fabrication of porous sintered ceramic separators and the technical feasibility of using such separators in Li-Al/molten LiCl-KCl/FeS battery cells were investigated. Processing techniques were developed to fabricate 1.5 to 2.5 mm thick, 35 to 60% porous, flat, sintered Y_2O_3 and MgO separator plates with sufficient strength to allow handling prior to and during cell assembly. The performance of the separators in laboratory scale cells for up to 2000 h and 283 cycles was examined. DOE

N80-13684# Sandia Labs., Albuquerque, N. Mex.
DEVELOPMENT OF A LITHIUM ALLOY/IRON DISULFIDE, 60-MINUTE PRIMARY THERMAL BATTERY
R. K. Quinn, A. R. Baldwin, J. R. Armijo, P. G. Neiswander, and D. E. Zurawski Apr. 1979 41 p refs
(SAND-79-0814) Avail: NTIS HC A03/MF A01

The development of a long life primary thermal battery is discussed. The feasibility of a 50 to 60 minute, 1 ampere, 28 volt, 400 cu cm primary battery is examined under ambient conditions. The active cell components, Li(Si)/LiCl, KCl/FeS2, of the electrochemical systems studies are described. DOE

N80-13685# Argonne National Lab., Ill.
ENGINEERING DEVELOPMENT OF LITHIUM/METAL SULFIDE BATTERY TECHNOLOGY FOR VEHICLE PROPULSION Summary Report, Oct. 1977 - Sep. 1978
D. L. Barney, A. A. Chilenskas, W. H. DeLuca, E. R. Hayes, F. Hornstra, M. K. Farahat, J. A. E. Graae, and S. Box Mar. 1979 35 p refs
(Contract W-31-109-eng-38)
(ANL-79-1) Avail: NTIS HC A03/MF A01

The research, development, and management activities done in preparation for in vehicle testing of engineering scale lithium/metal sulfide batteries are described. The equipment needed to evaluate the performance of this battery is described. Testing of this equipment is discussed. A portable charger/equalizer that has the capability of charging up to six lithium/metal sulfide cells is examined. DOE

N80-13686# General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
LARGE-SCALE ANNUAL-CYCLE THERMAL ENERGY STORAGE IN AQUIFERS
C. F. Meyer Apr. 1979 19 p refs Presented at Intern. Assembly on Energy Storage, Dubrovnik, Yugoslavia, 27 May 1979
(Contract W-7405-eng-26)
(CONF-790515-3) Avail: NTIS HC A02/MF A01

Thermal energy storage in aquifers is examined. Potential benefits of aquifer storage in a large district heating/cogeneration system proposed for an urban area are discussed. DOE

N80-13687# Lincoln Lab., Mass. Inst. of Tech., Lexington.
COST ANALYSIS OF PACKED BEDS FOR THERMAL ENERGY STORAGE
N. I. Hamilton 3 Dec. 1978 36 p refs
(Contract EX-76-A-01-2295)
(CAES-11) Avail: NTIS HC A03/MF A01

A cost analysis of packed beds for thermal-energy storage (TES) in an adiabatic compressed-air-energy storage system is given. Capital costs based on the conceptual design of a TES unit are estimated and their sensitivity to system parameter variation is studied. Two TES conceptual designs were considered for: an excavated cavity, and an abandoned mine. A cost comparison is made between surface-sited and underground TES. A cost model was constructed to study the effect of pebble size, insulation thickness, temperature, storage pressure, storage capacity, and other TES components on the TES capital cost. DOE

N80-13688# Battelle Columbus Labs., Ohio.
PHOTOVOLTAIC CONCENTRATOR APPLICATION EXPERIMENT. PHASE 1: A 150 kW PHOTOVOLTAIC CONCENTRATOR POWER SYSTEM FOR LOAD-CENTER APPLICATIONS WITH FEEDBACK INTO THE UTILITY GRID Final Report, 1 Jun. 1978 - 31 Mar. 1979
G. T. Noel, G. Alexander, L. H. Stember, G. H. Stickford, H. E. Smail, J. H. Broehl, and D. C. Carmichael Apr. 1979 123 p refs
(Contract ET-78-C-04-4267)
(DOE/CS-34267/1) Avail: NTIS HC A06/MF A01

A 150 kW peak concentrator-type photovoltaic power system was designed for multiple building load application. The system will operate in parallel with the utility grid (which provides backup power) to supply either or both of two service commercial buildings and will feed surplus power into the utility grid. System performance analysis indicates that the system will supply approximately 147,000 kWh/year to the primary load and an additional 55,000 kWh/year to the utility grid, in the single-load operational mode. The system design and the daily and seasonal match of system output with the load are described in detail. Plans are also discussed for installation and for operational evaluation of performance, economics, and institutional issues. DOE

N80-13689# Argonne National Lab., Ill.
STATUS OF DEVELOPMENT, ENERGY AND ECONOMICS ASPECTS OF ALTERNATIVE TECHNOLOGIES
P. S. Farber, C. D. Livengood, K. E. Wilzbach, W. L. Buck, and H. Huang 1979 49 p refs Presented at 5th Flue Gas Desulfurization Symp., Las Vegas, Nev., 5 Mar. 1979
(Contract W-31-109-eng-38)
(CONF-790371-1) Avail: NTIS HC A03/MF A01

Several energy technologies under development throughout the world which either totally negate the need for flue gas desulfurization or require less than full flue gas scrubbing are examined. These processes remove sulfur either prior to coal combustion during combustion, or between two combustion stages. The status of development and/or demonstration of these technologies with respect to the possible application to the generation of electricity is reviewed. The overall coal to electrical energy efficiency and economics (capital costs and total annualized costs, mills/kWh) are explored, and compared for the various alternatives. DOE

N80-13690# Los Alamos Scientific Lab., N. Mex.
CRITICAL REVIEW AND ASSESSMENT OF ENVIRONMENTAL AND SAFETY PROBLEMS IN HYDROGEN ENERGY SYSTEMS Progress Report, 1 Oct. 1977 - 30 Sep. 1979
F. J. Edeskuty, comp. and N. N. Sheheen, comp. May 1979 249 p refs
(Contract W-7405-eng-36)
(LA-7820-PR) Avail: NTIS HC A11/MF A01

The safety aspects and environmental problems of using hydrogen in energy systems are examined. Topics include hydrogen embrittlement, hydrogen dispersion after a gas leak of liquid spill, hydrogen combustion, an assessment of regulations and standards for hydrogen development, and hydrogen transmission through pipelines. A.W.H.

N80-13691# Department of Energy, Washington, D. C. Office of Solar, Geothermal, Electric and Storage Systems.
PHOTOVOLTAIC SYSTEMS. PROGRAM SUMMARY
Dec. 1978 366 p refs
(DOE/ET-0019/2) Avail: NTIS HC A16/MF A01

The photovoltaic systems program projects during fiscal year 1978 are described. The project sheets list the contractor, principal investigator, contract number and funding, and summarize the programs and status. The program is divided into various elements: program assessment and integration, research and advanced development, technology development, system definition and development, system application experiments, and standards and performance criteria. DOE

N80-13692# Lincoln Lab., Mass. Inst. of Tech., Lexington.
TEST PLAN FOR THE MEAD 25-kW PHOTOVOLTAIC FLEXIBLE TEST FACILITY, 1979
R. F. Hopkinson 15 Mar. 1979 21 p ref
(Contract EY-76-C-02-4094)
(COO-4094-53) Avail: NTIS HC A03/MF A01

The operations of the Mead 25-kW Photovoltaic System are reported along with descriptions on how the flexible test bed is expected to be used in experiments with a variety of PV applications, including irrigation, crop drying and fertilizer manufacturing. The planned operations for the Mead site during 1979 are given, and a schedule is attached. DOE

N80-13693# Sandia Labs., Albuquerque, N. Mex.
SANDIA LABORATORIES OPERATIONAL EXPERIENCE WITH SMALL HEAT ENGINES IN SOLAR THERMAL POWER SYSTEMS
Joseph P. Abbin, Jr. 1979 5 p refs Presented at 14th Intersoc. Energy Conversion Conf., Boston, 5 Aug. 1979
(Contracts EY-76-C-04-0789; DE-AC04-76DP-00789)
(SAND-78-2163C; CONF-790803-23) Avail: NTIS HC A02/MF A01

Hardware and operating experience obtained from the construction and testing of two small Rankine-cycle solar thermal power plants are described. The first plant is part of a prototype solar total energy system with an electrical generating capacity of 32 kW, and the second plant is part of a prototype solar irrigation unit with a shaft power output of 19 kW or an electrical output of 15 kW. DOE

N80-13694# Lincoln Lab., Mass. Inst. of Tech., Lexington.
NOVEL CERAMIC RECEIVER FOR SOLAR BRAYTON SYSTEMS
Philip O. Jarvinen 1979 7 p Presented at ASME Gas Turbine Closed-Cycle Session, San Diego, Calif., 12-15 Mar. 1979
(Contract ET-78-S-02-4878)
(COO-4878-3; CONF-790305-7) Avail: NTIS HC A02/MF A01

Receivers for solar thermal heated air Brayton power systems are discussed. The ceramic domed cavity receiver concept is examined. The development of a high temperature seal for the solar heating air cavity receiver is reported. Mechanical dome sealing methods for this purpose are reviewed and investigations to establish the technological foundation of the seal concepts by demonstrating that ceramic domes can be designed to support the combined pressure, thermal stress, and temperature loads of a heated air receiver are presented. A.W.H.

N80-13695# Argonne National Lab., Ill.
MATERIALS TESTING FOR CENTRAL RECEIVER SOLAR-THERMAL POWER SYSTEMS
S. Majumdar 1978 13 p
(Contract W-31-109-eng-38)
(TID-29443) Avail: NTIS HC A02/MF A01

Biaxial creep-fatigue tests (constant tensile hoop stress and cyclic axial strain with hold times in compression) were performed on type 316H stainless steel superheater tubing. A comprehensive survey of information on sodium effects on candidate materials for solar-thermal electric piping and steam generators was conducted. Mechanical property data were generated in support of the ASME code development. DOE

N80-13696# Argonne National Lab., Ill.
OTEC POWER SYSTEMS
1979 14 p refs Presented at Offshore Technol. Conf., Houston, Tex., 30 Apr. 1979
(Contract W-31-109-eng-38)
(CONF-790444-2) Avail: NTIS HC A02/MF A01

The technical features of design studies of power systems using shell and tube heat exchangers and shell-less heat exchangers are presented. Heat exchanger design, biofouling control, rotating equipment, auxiliaries, plant layout, and system cost are among the areas discussed. The role of the power systems development program in the larger OTEC program is also discussed. DOE

N80-13697# Solarex Corp., Rockville, Md.
SILICON CONCENTRATOR SOLAR CELL MANUFACTURING DEVELOPMENT
C. Wrigley, G. Storti, and J. Wohlgemuth Nov. 1978 69 p refs
(Contract EY-76-C-04-0789)
(SAND-79-7021) Avail: NTIS HC A04/MF A01

The program to design and develop the manufacturing technology for silicon solar cells suitable for low-cost photovoltaic concentrator systems is summarized. Detailed discussions are presented for the following tasks: concentrator design, manufacturing process development, solar cell measurement and evaluation, results experienced in cell manufacturing, and production cost estimates. Conclusions and recommendations are given. In particular, it is found that (1) large area concentrator cells with 15% efficiency at 50 suns are readily manufacturable; (2) DOE cost goals for 1981 to 1982 can be met today with market volumes at 200 to 1000 sq m per year; and (3) respectable manufacturing yields are achievable with the technology now developed. DOE

N80-13698# Foster Wheeler Corp., Livingston, N.J.
INTERIM STRUCTURAL DESIGN STANDARD FOR SOLAR ENERGY APPLICATIONS, PHASES 1 AND 2 Final Report
I. Berman, A. C. Gangadharan, G. D. Gupta, and T. V. Narayanan Jan. 1979 148 p refs
(Contract DE-AC04-76DP-00789)
(SAND-79-8183) Avail: NTIS HC A07/MF A01

Central receiver solar thermal power systems, relevant ASME codes, reliability considerations, and the criteria used to develop the interim design standard is reviewed. The interim design standard is presented. All criteria or rules chosen or adapted

from other codes are fully stated including all design data. A detailed paragraph-by-paragraph explanation of the interim design standard is provided. The test and development program needed to generate design data and to update the interim design standard are identified. DOE

N80-13699# Midwest Research Inst., Golden, Colo.
REVIEW OF SOLAR ENERGY Annual Report, 1977
Oct. 1978 179 p refs
(Contract EG-77-C-01-4042)
(SERI/TR-54-066) Avail: NTIS HC A09/MF A01

A general review of national solar energy programs is provided. An executive summary and a brief history of the Federal solar energy program are presented. The issues and implications of the National Energy Plan that relate to solar energy development are discussed. The present Federal solar energy program is discussed, including the activities of several Federal agencies outside the Department of Energy. Some of the non-Federal solar energy programs are reviewed, including international programs in which the U.S. has some role, programs of state and local governments, college and university programs, the work of private industry, and individual and small scale activities. A synopsis of the major categories of solar technology is provided. A synopsis of major energy events of 1977; a glossary of technical terms, abbreviations, and acronyms, and a table of conversion factors are included. DOE

N80-13700# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SOLAR CENTRAL RECEIVER PROTOTYPE HELIOSTAT CDRL ITEM B.D., VOLUME 1 Final Report
C. R. Easton Aug. 1978 339 p
(Contract EG-77-C-03-1605)
(SAN-1605/7-Vol-1; MDC-G7399-Vol-1) Avail: NTIS HC A15/MF A01

The preliminary design of a heliostat for central receiver solar thermal power systems which projects to meet the DOE's goal of $72/square m R at production volumes as low as 25,000 units per year and reduces to less than $60/square m R in very high volume production (approximately 1,000,000 units per year) is presented. The manufacturing process, installation and checkout procedures, operation and maintenance procedures, and specification verification and optimization are described. DOE

N80-13701# Department of Energy, Washington, D. C.
ENVIRONMENTAL DEVELOPMENT PLAN: WIND ENERGY CONVERSION
Jul. 1979 34 p refs
(DOE/EDP-0030) Avail: NTIS HC A03/MF A01

Projects or subprograms pertaining to windpower utilization that are likely to result in a demonstration or commercialization within the near term are presented. Projects that are expected to be considered in greater detail in the Environmental Development Plan update are identified. DOE

N80-13702# Ames Lab., Iowa.
FOSSIL ENERGY PROGRAM, 1. MINING RESEARCH AND DEVELOPMENT: COAL PREPARATION AND ANALYSIS Technical Progress Report, 1 Jan. - 31 Mar. 1979
Jun. 1979 31 p refs
(Contract W-7405-eng-82)
(IS-4703) Avail: NTIS HC A03/MF A01

The research and development technology in a number of areas in the fossil energy program are examined. Research topics discussed include the microstructure of coal, the development of an online monitoring instrument for pyrite and ash in coal, and coal blending experiments. A.W.H.

N80-13703# Electric Power Research Inst., Palo Alto, Calif.
SOLAR HEATING AND COOLING RESEARCH PROJECTS: A SUMMARY
Neal Lansing May 1979 30 p
(EPRI-ER-1095-SR) Avail: NTIS HC A03/MF A01

The major EPRI solar heating and cooling experiment projects are summarized. In addition to outlining each project and its purpose, the major features of the solar system are described. Also included are relatively detailed descriptions of the performance-monitoring equipment. As additional technical performance results are obtained and new projects added to the program, this document can be updated to include the new information. A basis for verification of analytic work aimed at determining the preferred solar system for any given utility service is provided, i.e., the system that provides the lowest total cost to the consumer and the utility. DOE

N80-13704# BDM Corp., Albuquerque, N. Mex.
PHOTOVOLTAIC TRANSIENT ANALYSIS PROGRAM USER'S GUIDE. VOLUME 1: EXECUTIVE SUMMARY
T. J. Lambarski, A. F. Malmberg, K. E. Melick, R. M. Turfler, and M. G. Semmens Oct. 1978 29 p refs
(Contract EY-76-C-04-0789)
(SAND-78-7038-Vol-1) Avail: NTIS HC A03/MF A01

A nonlinear, computer-aided circuit analysis program was designed for the analysis of electrical and thermal transients in large photovoltaic array systems. The program has time and frequency domain, Monte Carlo, and optimization solution capabilities and is capable of a wide range of analyses. The code can be used to address design issues on the individual cell level or up to megawatt arrays. Some of the issues that can be addressed include burnout analyses, illumination and load transients, fixed and propagating shadows, cell parameter optimization, collector and thermal system design trade-offs, power conditioning design analysis, aggregation pattern trade-offs, and many other types of analyses limited only by the user's imagination in applying this tool. The program objectives and capabilities are presented. DOE

N80-13705# Department of Energy, Washington, D. C. Office of Energy Research.
THIN FILM PROBLEMS AND RESEARCH IN ENERGY SYSTEMS
Jan. 1979 159 p refs Presented at ERDA/DPR Symp. on Thin Film Res., Pacific Grove, Calif., 1 Nov. 1976
(CONF-761168-Summ) Avail: NTIS HC A08/MF A01

Presentations and recommendations for future efforts in thin film research for energy related applications are presented. Long term thin film coating needs of three programs whose purpose is to develop national energy sources, are described along with the current state of the art of thin film related technologies. DOE

N80-13706# Argonne National Lab., Ill.
COMMUNITY HEATING AND COOLING SYSTEMS
J. M. Calm Apr. 1979 9 p refs Presented at 4th Ann. Heat Pump Technol. Conf., Stillwater, Okla., 9 Apr. 1979
(Contract W-31-109-eng-38)
(CONF-790446-6) Avail: NTIS HC A02/MF A01

Centralized, distributed, and cascaded heat pump centered integrated community energy systems (HP-ICES) approaches are discussed and an analysis showing their conservation potential is presented. Benefits of HP-ICES include reduction of adverse environmental effects, reliable production of services in view of increasingly frequent utility curtailments and interruptions, and provision of services at costs more favorable to consumers. DOE

N80-13707# Iowa State Univ. of Science and Technology, Ames.
ENERGY CONSERVATION VIA HEAT TRANSFER ENHANCEMENT Quarterly Progress Report, 1 Oct. - 31 Dec. 1978
A. E. Bergles, G. H. Junkhan, and R. L. Webb Mar. 1979 21 p refs
(Contract ET-78-S-02-4649)
(COO-4649-4) Avail: NTIS HC A02/MF A01

Research on energy conservation via heat transfer enhancement is summarized. Computerized retrieval files on technical literature, patents, and manufacturers were developed. DOE

N80-13708# Oak Ridge National Lab., Tenn.
INDUSTRIAL APPLICATIONS OF ADVANCED ENERGY SYSTEMS
J. E. Jones, Jr. 1979 3 p refs Presented at ANS Ann. Meeting, Atlanta, 3 Jun. 1979
(Contract W-7405-eng-26)
(CONF-790602-54) Avail: NTIS HC A02/MF A01

Industrial energy options based on coal and nuclear systems were assessed. Both high-temperature and low-temperature reactors were analyzed for heat process applications. In coal systems, a comparison was made of advanced energy conversion systems based on research and development experience. The important factors restricting the use of coal in industry were assessed. An atmospheric fluidized-bed combustion system for industrial cogeneration is discussed along with a preliminary market assessment for the technology. DOE

N80-13709# Sandia Labs., Albuquerque, N. Mex.
HYDRIDE ENGINES
A. A. Heckes, T. E. Hinkebein, and C. J. M. Northrup 1979 15 p refs Presented at 14th Intersoc. Energy Conversion Conf., Boston, 5 Aug. 1979
(Contract EY-76-C-04-0789)
(SAND-78-2303C; CONF-790803-19) Avail: NTIS HC A02/MF A01

Hydride engines are cyclically operated by first releasing hydrogen from metal hydrides at elevated temperatures. They perform work by moving an impermeable membrane. The hydrogen is subsequently reabsorbed at a lower temperature to return the system to the original state. Five engines which operate on this principle are described, two of which have been made operational. Efficiencies are discussed and comparisons made between Carnot, Rankine and Hydride engines which show that this engine is strongly competitive. DOE

N80-13710# Sandia Labs., Albuquerque, N. Mex.
WEIGHT MINIMIZATION OF SANDWICH TYPE SOLAR COLLECTOR PANELS
R. C. Reuter, Jr. 1979 13 p refs Presented at 14th Intersoc. Energy Conversion Conf., Boston, 5 Aug. 1979
(Contract EY-76-C-04-0789)
(SAND-78-2305C; CONF-790803-27) Avail: NTIS HC A02/MF A01

The existence, utilization and practicality of a minimum weight, adequately stiff design for sandwich panel construction in solar collector application was analytically evaluated. DOE

N80-13711# Rosenblatt (M.) and Son, Inc., New York.
OTEC PLATFORM CONFIGURATION AND INTEGRATION, EXECUTIVE SUMMARY Final Report
26 Jul. 1978 97 p
(Contract EG-76-C-01-4065)
(DOE/ET-4065/1) Avail: NTIS HC A05/MF A01

The commercialization of the ocean thermal energy conversion (OTEC) concept is discussed. Various areas of the OTEC plant development are examined. These include the design of a marine vessel to house the OTEC power cycle, the development of an OTEC power cycle, studies of the site environment, and the effects of biofouling and corrosion on any of the OTEC components. A.W.H.

N80-13712# Rosenblatt (M.) and Son, Inc., New York.
OTEC PLATFORM CONFIGURATION AND INTEGRATION. VOLUME 2: TECHNICAL CONCEPT Final Report
7 Jul. 1978 307 p refs
(Contract EG-77-C-01-4065)
(DOE/ET-4065/1-Vol-2) Avail: NTIS HC A14/MF A01

The configuration, integration, and evaluation studies performed for commercial OTEC applications are presented. The results of conceptual designs for the platforms, the facilities and equipment required for construction, deployment, operation of the OTEC platforms, and cost estimates and time schedules are discussed. DOE

N80-13713# Rosenblatt (M.) and Son, Inc., New York.
OTEC PLATFORM CONFIGURATION AND INTEGRATION, APPENDIXES TO VOLUME 2 Final Report
7 Jul. 1978 159 p
(Contract EG-76-C-01-4065)
(DOE/ET-4065/1-Vol-2-App) Avail: NTIS HC A08/MF A01

Detailed information and conceptual design drawings for the spar and sphere platforms for an OTEC commercial plant are presented. A work breakdown structure and a detailed estimate of the spar platform weight are included. DOE

N80-13714# Rosenblatt (M.) and Son, Inc., New York.
OTEC PLATFORM CONFIGURATION AND INTEGATION. VOLUME 3: PROJECT PLAN Final Report
7 Jul. 1978 64 p refs
(DOE/ET-4065/1-Vol-3) Avail: NTIS HC A04/MF A01

The spar and sphere offshore platforms were used to demonstrate the feasibility of a near full size ocean thermal energy conversion (OTEC) plant and to gather data for use in the construction, design and operation of commercial OTEC plants. A hull size suitable to support a 100 MWe net output plant was chosen. Construction of the hull and installation of all equipment is proposed for three sites: (1) a shoreside construction site; (2) an offshore site in sufficient water depth to complete the hull erection; and (3) installation of the cold water pipe at the demonstration site. DOE

N80-13715# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY. PART 1: EXPLORATION, VOLUME 3. CITATIONS FROM THE NTIS DATA BASE Progress Report, May 1976 - Jun. 1979
Audrey S. Hundemann Aug. 1979 264 p Supersedes NTIS/PS-78/0664; NTIS/PS-77/0561 Updates NTIS/PS-76/0463
(NTIS/PS-79/0814/8; NTIS/PS-78/0664; NTIS/PS-77/0561) Avail: NTIS HC $28.00/MF $28.00 CSCL 08I

The bibliography cites Federally-funded research on geophysical methods, such as electrical resistivity, seismology, magnetic anomaly, and electromagnetic measurements in geothermal site survey determination. Studies on well logging, remote sensing, geochemistry, mineralogy, radioactivity, mapping, volcanism, and structural geology are also cited. Criteria for location of geothermal areas are suggested in these abstracts. This updated bibliography contains 256 abstracts, 81 of which are new entries to the previous edition. GRA

N80-13716# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY. PART 2: CORROSION AND EQUIPMENT, VOLUME 3. CITATIONS FROM THE NTIS DATA BASE Progress Report, May 1976 - Jul. 1979
Audrey S. Hundemann Aug. 1979 165 p Supersedes NTIS/PS-78/0665; NTIS/PS-77/0562 Updates NTIS/PS-76/0463
(NTIS/PS-79/0815/5; NTIS/PS-78/0665; NTIS/PS-77/0562) Avail: NTIS HC $28.00/MF $28.00 CSCL 08I

Citations of Government-sponsored research reports on corrosion and equipment studies related to geothermal energy are presented. Studies on pumps, turbines, drilling equipment, pipes, nozzles, and well casings are covered, along with studies on materials including concretes, steels and nonferrous alloys. Silica precipitation and scale formation on equipment are also cited. Performance of equipment in working fluids and brines and the chemical processes affecting performance are included. This updated bibliography contains 157 abstracts, 70 of which are new entries to the previous edition. GRA

N80-13717# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY. PART 3: TECHNOLOGY AND GENERAL STUDIES, VOLUME 3. CITATIONS FROM THE NTIS DATA BASE Progress Report, May 1976 - Dec. 1977
Mona F. Smith Aug. 1979 247 p Updates NTIS/PS-76/0463
(NTIS/PS-79/0816/3) Avail: NTIS HC $28.00/MF $28.00 CSCL 08I

The bibliography covers Government-sponsored research on geothermal energy conversion, power plants, heat extraction, and space heating. Studies on fluid flow, heat transfer, rock fracturing, computerized simulation, pressure, and reservoir engineering are included. Reports on economics, legislation, technology assessment, comparative evaluation with other energy sources, Government policies, and planning are also cited. This updated bibliography contains 239 abstracts, none of which are new entries to the previous edition. GRA

N80-13718# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY, VOLUME 3. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, May 1976 - Jul. 1978
Mona F. Smith Aug. 1979 329 p
(NTIS/PS-79/0818/9) Avail: NTIS HC $28.00/MF $28.00 CSCL 08I

Citations from worldwide literature on geothermal energy conversion, feasibility, development, and cost estimates are presented. Studies on geothermal exploration, drilling technology, fluid flow, convection, thermodynamics, heat extraction, and electric power plants are covered. Equipment, corrosion, reservoir engineering, and remote sensing are included. This updated bibliography contains 323 abstracts, none of which are new entries to the previous edition. GRA

N80-13719# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY. PART 3: TECHNOLOGY AND GENERAL STUDIES, VOLUME 4. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1978 - Jun. 1979
Audrey S. Hundemann Aug. 1979 203 p Supersedes NTIS/PS-78/0666; NTIS/PS-77/0563 Updates NTIS/PS-76/0463
(NTIS/PS-79/0817/1; NTIS/PS-78/0666; NTIS/PS-77/0563; NTIS/PS-76/0463) Avail: NTIS HC $28.00/MF $28.00 CSCL 08I

Research on geothermal energy conversion, power plants, heat extraction, and space heating is reported. Studies on fluid flow, heat transfer, rock fracturing, computerized simulation, pressure, and reservoir engineering are included. Reports on economics, legislation, technology assessment, and comparative evaluation with other energy sources, are presented. This updated bibliography contains 195 abstracts, all of which are new entries to the previous edition. GRA

N80-13720# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY, VOLUME 4. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, Aug. 1978 - Jul. 1979
Audrey S. Hundemann Aug. 1979 149 p Supersedes NTIS/PS-78/0667; NTIS/PS-77/0565; NTIS/PS-76/0465
(NTIS/PS-79/0819/7; NTIS/PS-78/0667; NTIS/PS-77/0565; NTIS/PS-76/0465) Avail: NTIS HC $28.00/MF $28.00 CSCL 08I

Citations from worldwide literature on geothermal energy conversion, feasibility, development and cost estimates are presented. Studies on geothermal exploration, drilling technology, fluid flow, convection, thermodynamics, heat extraction, and electric power plants are covered. Equipment, corrosion, reservoir engineering, and remote sensing are included. This updated bibliography contains 143 abstracts, all of which are new entries to the previous edition. GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N80-13721*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN ANALYTICAL STUDY OF NITROGEN OXIDES AND CARBON MONOXIDE EMISSIONS IN HYDROCARBON COMBUSTION WITH ADDED NITROGEN, PRELIMINARY RESULTS
David A. Bittker [1979] 17 p refs Proposed for presentation at the 25th Intern. Gas Turbine Conf., New Orleans, 9-13 Mar. 1980; sponsored by ASME
(Contract EF-77-A-01-2593)
(NASA-TM-79296; DOE/NASA/2593-79/10) Avail: NTIS HC A02/MF A01 CSCL 13B

The effect of combustor operating conditions on the conversion of fuel-bound nitrogen (FBN) to nitrogen oxides NO sub x was analytically determined. The effect of FBN and of operating conditions on carbon monoxide (CO) formation was also studied. For these computations, the combustor was assumed to be a two stage, adiabatic, perfectly-stirred reactor. Propane-air was used as the combustible mixture and fuel-bound nitrogen was simulated by adding nitrogen atoms to the mixture. The oxidation of propane and formation of NO sub x and CO were modeled by a fifty-seven reaction chemical mechanism. The results for NO sub x and CO formation are given as functions of primary and secondary stage equivalence ratios and residence times. R.E.S.

N80-13722# California Univ., Berkeley. Lawrence Berkeley Lab.
INSTRUMENTATION FOR ENVIRONMENTAL MONITORING
R. D. McLaughlin, M. S. Hunt, D. L. Murphy, and C. R. Chen Jun. 1979 14 p Presented at the 13th Ann. Conf. on Track Substances in Environ. Health, Columbia, Mo., 4-7 Jun. 1979
(Contract W-7405-eng-48)
(LBL-9323; CONF-790673-2) Avail: NTIS HC A02/MF A01

The selection of analytical instrumentation for the determination and monitoring of environmental pollutants is discussed. Air, water, and radiation media are considered. K.L.

N80-13723# Oregon State Univ., Corvallis. Air Resources Center.
CRITIQUE OF THE METEOROLOGICAL AND AIR QUALITY BASELINE MONITORING PROGRAM FOR THE PROTOTYPE OIL SHALE LEASEHOLDS. PART A: COMMENTS ON THE APPROACH TAKEN AND RECOMMENDATIONS FOR CONTINUING PROGRAM. PART B: COMMENTS ON THE DATA ACQUISITION AND MANAGEMENT
W. G. N. Slinn, M. A. Wolf, and J. P. Hennessey, Jr. Nov. 1978 58 p refs
(Contract EY-76-S-06-2227)
(DOE/EV-70031/4-Pt-A/B; RLO-2227-T31-4-Pt-A/B) Avail: NTIS HC A04/MF A01

The environmental impact is considered in the event that extensive oil shale resources of Colorado, Utah, and Wyoming are developed to augment the nation's energy needs. Reasons are suggested why existing knowledge is inadequate to provide a valid answer. A means is proposed for accomplishing this important task within a suitable time-period and at a reasonable level of funding. The probable cause of deficiences is identified in the meteorological and air quality data which were acquired over a two-year period on the Federal oil shale leaseholds and improved procedures for future data acquisition efforts are recommended. DOE

N80-13724# Dalton, Dalton, Little, and Newport, Inc., Cleveland, Ohio.
GUIDELINES FOR MULTIMEDIA ENVIRONMENTAL MONITORING OF DEPARTMENT OF ENERGY FOSSIL ENERGY RD AND D FACILITIES
Robert G. Rolan Nov. 1978 483 p
(Contract EX-76-C-01-2495)
(FE-2495-T13-Vol-2) Avail: NTIS HC A21/MF A01

The potential sensitivity of the environment to generators from DOE fossil energy activities is examined as a step in selecting parameters which should be monitored. Basic ecological concepts and terminology that will be needed in properly designing a monitoring program for a DOE fossil energy RD and D facility are introduced. Analytical hardware options available for monitoring, sampling and analytical methods, data recording, data processing and retrieval, and data quality control and assurance are discussed. DOE

N80-13725# Sandia Labs., Albuquerque, N. Mex.
CARBON PARTICULATE MEASUREMENTS IN A DIESEL ENGINE
S. C. Keeton Jun. 1979 42 p refs
(Contract EY-76-C-04-0789)
(SAND-79-8210) Avail: NTIS HC A03/MF A01

Various optical techniques are considered for counting and sizing soot particles in the combustion chamber of diesel engines. Imaging and single-particle methods are not applicable because the majority of light scattering by the distribution of particles resulting from diesel combustion comes from particles which

are too small for those techniques. Many-particle scattering techniques, such as extinction and right angle scattering, show promise but will generate quantitative particle sizing information only if the particle diameter distribution function and index of refraction are known for the soot system being studied. The use of several laser wavelengths separated by at least several hundred Angstroms, however, would allow the use of a distribution function with several unknown parameters. DOE

N80-13726# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Abt. Meerestechnik.
STRATEGIES FOR THE SURVEILLANCE OF COASTAL WATERS OF THE FEDERAL REPUBLIC OF GERMANY Final Report
Helmut Kosche Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1977 181 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. u. Technol.
(BMFT-FB-M-77-11) Avail: NTIS HC A09/MF A01; ZLDI, Munich DM 37.80

Strategies for surveillance of anorganic and organic pollutants in coastal waters are necessary to fulfill international conventions. The development of a realistic strategy for the surveillance of low and slowly changing concentration levels is intended. The analysis of collected data show that the knowledge of anorganic pollutants surpasses the knowledge of organic pollutants. The necessary detection limits are in the range of ppb for anorganic and ppt for organic pollutants. Existing measuring devices are presented and discussed with regard to their useful ranges and merits. In addition, the possible potential and use of biological indicators as well as of remote sensing is discussed. The resulting, proposed strategy consists of a three element approach (coordination of existing activities, installment of a central institution, special activities regarding accidents with pollutants) based on sampling, preparation, the use of laboratories, and scientific interpretation. Author (ESA)

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N80-13727 California Univ., San Diego.
CRUSTAL STRUCTURE IN AREAS OF ACTIVE CRUSTAL ACCRETION Ph.D. Thesis
Leonard Dale Bibee 1979 169 p
Avail: Univ. Microfilms Order No. 7926689

The geophysical characteristics of the oceanic crust and upper mantle are studied in three areas where crust is presently being formed by a seafloor spreading process. The results of these investigations are combined with previous studies to place constraints on the geologic processes occurring during crustal formation and subsequent evolution. The areas discussed are the Mariana Trough, the East Pacific Rise at 10 deg S, and the Galapagos Rift at 86 deg W. Dissert. Abstr.

N80-13728 Alaska Univ., College.
RADAR MEASUREMENTS OF TEMPERATURES AND IONIC COMPOSITION IN THE HIGH-LATITUDE IONOSPHERE Ph.D. Thesis
John David Kelly 1979 143 p
Avail: Univ. Microfilms Order No. 7927661

Continuous ground based measurements of high latitude ionospheric temperatures and ion composition including both quiet and disturbed periods are presented. The measurements were made with the incoherent scatter radar located at Chatanika, Alaska (L = 5.6). The electron temperature increased as much as 1000 K above the neutral gas temperature during periods of energetic particle precipitation, and ion temperatures also increased by a similar amount during a large joule heating event. The largest change in the ion composition oocurred during the large joule heating event. The transition altitude increased at least 50 km and remained elevated for several hours. A seasonal variation, similar to midlatitude observations, was also observed -- the daytime transition altitude is approximately 15 km lower in the winter than in the summer. Dissert. Abstr.

N80-13729 Alaska Univ., College.
A THEORY FOR THE ASYMMETRY IN THE AURORAL IONIZATION DENSITY PROFILE FOR THE GENERATION OF AURORAL INFRASONIC WAVES Ph.D. Thesis
Paul Albert Goodwin 1979 147 p
Avail: Univ. Microfilms Order No. 7927660

Theoretical calculations, beginning with a model of an auroral precipitation region, are presented to show that there can be a significant difference in the transverse ionization density profiles between an auroral arc that is moving equatorward and an arc that is moving poleward, for a given equatorward-directed E-region ambient electric field. The calculation was accomplished by solving the equations of motion and continuity for the cross-sectional ionization density profile associated with the transverse motion of a filamentary auroral electrojet. Thus it is shown that there is an asymmetry in the ionization profiles associated with moving arcs, and in their coupling, that is related to the relative direction of motion of the arc with respect to the ambient electric field, and that it is this asymmetry that is probably the cause of the observed AIW reception asymmetry. Dissert. Abstr.

N80-13730*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN ASYMPTOTIC EXPANSION APPROACH TO THE INVERSE RADIATIVE TRANSFER PROBLEM
Richard I. Gomberg and James J. Buglia Washington Dec. 1979 32 p refs
(NASA-TP-1587; L-13165) Avail: NTIS HC A03/MF A01 CSCL 04A

An iterative technique which recovers density profiles in a nonhomogeneous absorbing atmosphere is derived. The technique is based on the concept of factoring a function of the density profile into the product of a known term and a term which is not known, but whose power series expansion can be found. This series converges rapidly under a wide range of conditions. A demonstration example of simulated data from a high resolution infrared heterodyne instrument is inverted. For the examples studied, the technique is shown to be capable of extracting features of ozone profiles in the troposphere and to be particularly stable. J.M.S.

N80-13731*# Ohio State Univ. Research Foundation, Columbus.
INVESTIGATIONS ON THE HIERARCHY OF REFERENCE FRAMES IN GEODESY AND GEODYNAMICS
Erik W. Grafarend, Ivan I Mueller, Haim B. Papo, and Burghard Richter Aug. 1979 127 p refs
(Grant NsG-5265)
(NASA-CR-162499; Rept-289) Avail: NTIS HC A07/MF A01 CSCL 08G

Problems related to reference directions were investigated. Space and time variant angular parameters are illustrated in hierarchic structures or towers. Using least squares techniques, model towers of triads are presented which allow the formation of linear observation equations. Translational and rotational degrees of freedom (origin and orientation) are discussed along with and the notion of length and scale degrees of freedom. According to the notion of scale parallelism, scale factors with respect to a unit length are given. Three-dimensional geodesy was constructed from the set of three base vectors (gravity, earth-rotation and the ecliptic normal vector). Space and time variations are given with respect to a polar and singular value decomposition or in terms of changes in translation, rotation, deformation (shear, dilatation or angular and scale distortions). R.E.S.

N80-13732# Sandia Labs., Albuquerque, N. Mex.
AVERAGE STRUCTURE OF THE UPPER EARTH MANTLE AND CRUST BETWEEN ALBUQUERQUE AND THE NEVADA TEST SITE
H. D. Garbin Aug. 1979 22 p refs
(Contract EY-76-C-04-0789)
(SAND-79-0975) Avail: NTIS HC A02/MF A01

Models of Earth structure were constructed by inverting seismic data obtained from nuclear events with a 1600 m long

laser strain meter. With these models the general structure of the Earth's upper mantle and crust between Albuquerque and the Nevada Test Site was determined. DOE

N80-13733# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
IN SITU STRESS FIELD IN THE SOUTHEASTERN UNITED STATES AND ITS IMPLICATION
D. E. Stephenson and H. R. Pratt 1979 21 p refs Presented at 27th Ann. Meeting of the Southeastern Section of the Geological Soc. of Am., Blacksburg, Va., 26 Apr. 1979
(Contract EY-76-C-09-0001)
(DP-MS-78-95; CONF-790497-2) Avail: NTIS HC A02/MF A01

Published and unpublished in situ stress measurements and studies of earthquake focal mechanisms in the southeastern United States are reviewed. These data, which provide information on the relative magnitude and orientation of existing stress fields, are analyzed in relation to the geologic characteristics of the Southeast and are compared with data for other areas in the United States. The relation of the stress fields to observed geology and present day tectonic processes is reviewed. Stress measurements reveal the existence of high horizontal stresses in the Appalachian complex. Different in situ stress states in the Appalachian complex, the Coastal Plain, and the stable interior region indicate different faulting mechanisms. Various techniques for determining in situ stress are consistent. DOE

N80-13734# Agbabian Associates, El Segundo, Calif.
REVIEW OF EARTHQUAKE VIBRATORY GROUND MOTION INTENSITY ATTENUATION RELATIONSHIPS
G. A. Young 30 Sep. 1978 104 p refs
(Contract EY-76-C-03-1011)
(SAN-1011/119) Avail: NTIS HC A06/MF A01

A review of earthquake vibratory ground motion intensity-distance-attenuation relationships is presented which depicts the evolution and limitations of currently used procedures. Two general procedures are considered; one procedure relates peak horizontal ground acceleration, earthquake magnitude, and distance, and the other relates epicentral modified Mercalli intensity (MMI), distance, and attenuated MMI. A conversion relationship between MMI and peak horizontal ground acceleration is used with the latter. DOE

N80-13735# Cincinnati Univ., Ohio. Sedimentology Lab.
DEVONIAN PALEOCURRENTS OF THE APPLACHIAN BASIN
Paul Edwin Potter, Wayne A. Pryor, Paul Lundegard, Neil Samuels, and J. Barry Maynard May 1979 66 p refs
(Contract DE-AC21-76MC-05201)
(METC/CR-79/22) Avail: NTIS HC A04/MF A01

The methodology of paleocurrent studies in shaly basins based on both outcrops and oriented cores is set forth as is the relationship between paleocurrents and gas potential. The paleocurrent system of the central and northern Appalachian basin was found to be uniformly oriented to the west. Paleocurrent indicators are at right angles to isopach of total Devonian thickness, which decreases westward from 12,000 ft in eastern Pennsylvania to a few hundred ft in west central Ohio. This clastic wedge is largely of Upper Devonian age and includes alluvial and delta plain environments as well as shelf turbidite slope, and basin plain environments, the latter representing most of the black shales. The gradient of carbon isotopes, which shows more marine than terrestrial carbon in the western part of the basin, closely parallels the average paleocurrent direction of the basin. DOE

N80-13736# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).
STUDIES ON THE THERMOSPHERE AND IONOSPHERE BASED ON A DETAILED ANALYSIS OF TOPSIDE IONOGRAMS Final Report
Walter Becker Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 45 p refs In GERMAN; ENGLISH summary
(Contract BMFT-WRT-181)
(BMFT-FB-W-78-01) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9.25

Alouette 1 ionograms (41,398) and ionograms (24,661) taken by the ISIS 2 satellite were converted to electron density height profiles of the upper ionosphere A semi-automated scaling technique designed for this purpose, is briefly described. Included is an outline of the software. The invariant standard profile of the lower ionosphere obtained by midlatitude stations for a local noon interval was used in comparison. The standard deviations of the individual profiles from this standard profile do not show any remarkable difference. The relevance of this result for prediction work and theoretical studies is pointed out. No poor fits of simultaneous upper and lower electron density height profiles are reported for cases of a horizontally stratified ionosphere. Extreme critical frequency variations of the F layer from day to day could not be explained by distortions in the shape of the F layer. Author (ESA)

N80-13737# Royal Aircraft Establishment, Farnborough (England).
THE GRAVITY FIELD OF THE EARTH
D. G. King-Hele London HMSO Nov. 1978 26 p refs
(RAE-TR-78142; RAE-Space-560; BR66968) Avail: NTIS HC A03/MF A01

Progress in the determination of the Earth's gravitational field is briefly outlined. Some attempt is made to assess the accuracy of current geoid maps and were of harmonic coefficients as exemplified in the latest models derived at the Goddard Space Flight Center. The harmonic coefficients of order 14, 15, and 30 in the Goddard Earth Model (GEM) 10B are compared with values obtained independently by analysis of resonant orbits. The results suggest that the values in GEM are realistic for these orders, and presumably others. It appears that the accuracy of the geoid maps is now approaching 1 m. Author (ESA)

N80-13738# Centre de Recherches en Physique de l'Environnement Terrestre et Planetaire, Orleans (France).
REPORT ON FRENCH RESEARCH INTO THE IONOSPHERE-MAGNETOSPHERE FROM 1975 TO 1978 [RAPPORT NATIONAL SUR LES TRAVAUX FRANCAIS EXECUTES DE 1975 A 1978 DANS LA DISCIPLINE "IONOSPHERE-MAGNETOSPHERE"]
C. Beghin Jan. 1979 28 p refs In FRENCH Presented at I'A. G. de l'UGGI, Canberra, Australia, 1979
(CRPE-DT-1039) Avail: NTIS HC A03/MF A01

French attempts from 1975 to 1978 to understand the phenomena and the laws controlling the stability and dynamics of the ionized environment around the Earth are summarized, including a description of the specific techniques for the study of the ionosphere and magnetosphere, the modeling of the ionized media, the study of the overall dynamics as well as macroscopic processes and particular phenomena. Author (ESA)

N80-13739# Lille Univ. (France).
ATMOSPHERIC CORRECTION OF SURFACE TEMPERATURE MEASUREMENTS IN A 10.5 TO 12.5 MICRON CHANNEL FROM AVHRR/TIROS-N
P. Y. Deschamps, T. Phulpin (Centre de Meteorol. Spatiale, Lannion, France), and B. Tournier (Centre de Meteorol. Spatiale, Lannion, France) 1978 5 p refs Presented at 22d COSPAR Plenary Meeting, Bangalore, India, May-Jun. 1979
Avail: NTIS HC A02/MF A01

The algorithms needed for the atmospheric correction of the 10.5 to 12.5 micron window channel are studied, concluding that the space measurements of the surface temperature by means of the mentioned infrared channel may be corrected using data from the AVHRR experiment on board the TIROS-N satellite. Best results are obtained when associating the 3.7 and 12 micron infrared channels to obtain an absolute accuracy on the retrieved surface temperature better than 1 K. Author (ESA)

N80-13530*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GLOBAL ASPECTS OF THE EARTH'S MAGNETOPAUSE
D. H. Fairfield *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 5-13 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

N80-13531# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
AN ELECTRIC-CURRENT MODEL OF THE MAGNETOSPHERE

H. Alfven *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 15-21 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13532# Max-Planck-Institut fuer Extraterrestrische Physik, Garching (West Germany).
PLASMA STRUCTURE OF THE MAGNETOPAUSE AND BOUNDARY LAYER
G. Paschmann *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 25-36 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13533# Max-Planck-Institut fuer Extraterrestrische Physik, Garching (West Germany).
EXTERNAL PLASMA FLOW
N. Sckopke *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 37-42 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13534*# California Univ., Berkeley. Inst. of Geophysics and Planetary Physics.
ISEE-1 AND 2 MAGNETOMETER OBSERVATIONS OF THE MAGNETOPAUSE
R. C. Elphic and C. T. Russell *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 43-50 refs (For primary document see N80-13529 04-42)
(Contract NAS5-20064)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

N80-13535# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
QUASISTATIC ELECTRIC FIELDS OBSERVED DURING A NUMBER OF MAGNETOPAUSE CROSSINGS BY ISEE-1
U. V. Fahleson, C. G. Faelthammar, P. A. Lindqvist, F. S. Mozer (Calif. Univ., Berkeley), R. B. Torbert (Calif. Univ., Berkeley), A. Gonfalone (ESTEC, Noordwijk, Netherlands), and A. Pedersen (ESTEC, Noordwijk, Netherlands) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 51-65 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13536# European Space Technology Center, Noordwijk (Netherlands). Space Science Dept.
MAGNETOPAUSE ELECTRIC AND MAGNETIC FIELD SIGNATURES AT TIMES OF MAGNETOSPHERIC COMPRESSIONS
R. Grard, A. Pedersen, F. Mariani (CNR, Frascati, Italy), and C. Signorini (CNR, Frascati, Italy) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 67-72 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13537# European Space Technology Center, Noordwijk (Netherlands). Space Science Dept.
RADIAL DISCONTINUITIES IN LOW-ENERGY MAGNETOSPHERIC PLASMA OBSERVED ON GEOS-1
K. Knott, R. Grard, and A. Pedersen *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 75-79 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13538# Kiruna Geophysical Inst. (Sweden).
FIRST OBSERVATIONS OF A HEATED PLASMA COMPONENT IN THE PLASMA MANTLE
B. Hultqvist, R. Lundin, I. Sandahl, N. Pissarenko (Acad. of Sci., Moscow), and A. Zacharov (Acad. of Sci., Moscow) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 83-89 refs Sponsored in part by Swedish Board for Space Activities (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13539# Kiruna Geophysical Inst. (Sweden).
FIRST OBSERVATIONS OF THE HOT ION COMPOSITION IN THE HIGH ALTITUDE MAGNETOSPHERIC BOUNDARY LAYER BY MEANS OF PROGNOZ-7
R. Lundin, I. Sandahl, B. Hultqvist, A. Galeev (Acad. of Sci., Moscow), O. Likhin (Acad. of Sci., Moscow), A. Omelchenko (Acad. of Sci., Moscow), N. Pissarenko (Acad. of Sci., Moscow), O. Vaisberg (Acad. of Sci., Moscow), and A. Zacharov (Acad. of Sci., Moscow) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 91-96 refs Sponsored in part by Swedish Board for Space Activities (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13540# Aerospace Corp., Los Angeles, Calif. Space Sciences Lab.
OBSERVATIONS OF ION AND ELECTRON DISTRIBUTIONS DURING THE JULY 29 AND JULY 30, 1977 STORM PERIOD
J. F. Fennell, P. F. Mizera, and D. R. Croley, Jr. *In* ESA Magnetospheric Boundary Layers 1979 p 97-111 refs (For primary document see N80-13529 04-42)
(Contract F04701-78-C-0079; Grant NSF ATM-78-03600)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13541# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).
MAGNETIC PULSATIONS OBSERVED ON BOARD GEOS-2 IN THE ULF RANGE DURING MULTIPLE MAGNETOPAUSE CROSSINGS
S. Perraut, R. Gendrin, P. Robert, and A. Roux *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 113-122 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13542# Danish Space Research Inst., Lyngby.
CRITICAL LEVEL BEHAVIOR OF ION-CYCLOTRON WAVES AT MAGNETOSPHERIC BOUNDARY LAYERS
J. F. McKenzie *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 123-127 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13543# Sheffield Univ. (England). Dept. of Physics.
A WAVE-PARTICLE-WAVE INTERACTION OBSERVED ON GEOS-2
T. R. Kaiser *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 129-130 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13544*# California Inst. of Tech., Pasadena.
ENERGETIC ELECTRON BURSTS IN THE MAGNETOPAUSE ELECTRON LAYER AND IN INTERPLANETARY SPACE
J. W. Bieber and S. C. Stone *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 131-135 refs (For primary document see N80-13529 04-42)
(Contract NAS5-11066; Grant NGR-05-002-160)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

N80-13545# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).
ION AND ELECTRON LAYERS AT THE MAGNETOPAUSE: ISEE-2
P. W. Daly, E. Keppler, and D. J. Williams (NOAA Space Environ. Lab.) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 137-141 refs Co-sponsored by Max-Planck Ges. (For primary document see N80-13529 04-42)
(Contract BMFT-RV-14-B30/73)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13546# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
PARTICLE AND FIELD CHARACTERISTICS OF THE DAYSIDE MAGNETOPAUSE ENERGETIC ELECTRON LAYER
Ching-I. Meng (Iowa Univ., Iowa City), L. A. Frank (Iowa Univ., Iowa City), and K. L. Ackerson *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 143-148 refs (For primary document see N80-13529 04-42)
(Contract NSF ATM-75-02621)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13547*# Washington Univ., Seattle.
PARTICLE BOUNDARY STRUCTURES AT THE MAGNETOPAUSE AND THE PLASMA SHEET
G. K. Parks, C. S. Lin (California Univ., Berkeley), K. A. Anderson (Paul Sabatier Univ., Toulouse), R. P. Lin (California Univ., Los Angeles), H. Reme (John Hopkins Univ., Baltimore), F. Coroniti (Ecole Polytech., Paris), C. Meng, and R. Pellat *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 151-156 refs (For primary document see N80-13529 04-42)
(Contracts NAS5-20079; CNES-212)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

N80-13548# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).
VARIATIONS OF ELECTRON AND ION DISTRIBUTIONS DURING DAYSIDE MAGNETOPAUSE CROSSINGS OF GEOS-2
A. Korth, G. Kremser, B. Wilken, E. Amata (Lab. Plasma Spazio), and M. Candidi (Lab. Plasma Spazio) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 157-159 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13549# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).
MULTIPLE-SATELLITE OBSERVATIONS OF LARGE SCALE TRAPPING BOUNDARY MOTIONS
B. Wilken, A. Korth, G. Kremser, and Th. A. Fritz (NOAA Space Environment Lab.) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 161-163 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13550*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
LOW-ALTITUDE SIGNATURES OF THE BOUNDARY LAYERS
P. H. Reiff *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 167-173 refs (For primary document see N80-13529 04-42)
(Grants NGR-44-006-012; NSG-5286; NSF ATM-77-12619)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

N80-13551*# Texas Univ., Dallas. Center for Space Sciences.
IONOSPHERIC CONVECTION AT HIGH LATITUDES
R. A. Heelis *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 175-181 refs (For primary document see N80-13529 04-42)
(Contract NAS5-11407; Grant NGR-44-004-120)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

N80-13552# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).
STARE IONOSPHERIC ELECTRON FLOWS DURING THE AUGUST 28, 1978 GEOS-2 MAGNETOPAUSE CROSSING
G. J. Sofko, R. A. Greenwald, A. Korth, and G. Kremser *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 183-185 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13553# Lockheed Missiles and Space Co., Palo Alto, Calif.
ION COMPOSITION IN THE DAYSIDE CUSP: INJECTION OF IONOSPHERIC IONS INTO THE HIGH LATITUDE BOUNDARY LAYER
E. G. Shelley *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 187-192 refs Sponsored in cooperation with Office of Naval Res. and NSF (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13554# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
BIRKELAND CURRENTS AND THE INTERPLANETARY MAGNETIC FIELD
T. A. Potemra and N. A. Saflekos (Boston Coll.) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 193-198 refs Sponsored in cooperation with Office of Naval Res. and NSF (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13555# Boston Coll., Chestnut Hill, Mass. Dept. of Physics.
DAYSIDE AURORA AND SUBSTORM CURRENT SYSTEMS
R. H. Eather, S. B. Mende (Lockheed Res. Lab., Palo Alto, Calif.), and E. J. Weber (Air Force Geophysics Lab.) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 199-206 refs (For primary document see N80-13529 04-42)
(Contract NSF C-659)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13556# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
COMMENTS ON THE LOW-ALTITUDE OPTICAL SIGNATURES OF MAGNETOSPHERIC BOUNDARY LAYERS
M. M. Shepherd and G. G. Shepherd *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 207-208 (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13557# Cornell Univ., Ithaca, N. Y. School of Electrical Engineering.
LOW FREQUENCY WAVES AND IRREGULARITIES IN THE LOW ALTITUDE BOUNDARY LAYER
P. Kintner and M. Temerin (California Univ., Berkeley) *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 209-216 refs (For primary document see N80-13529 04-42)
(Contract N00014-75-C-0780)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13567# Centre de Recherches en Physique de l'Environnement Terrestre et Planetaire, Orleans (France).
KINETIC THEORY OF THE BOUNDARY LAYER BETWEEN A FLOWING ISOTROPIC PLASMA AND A MAGNETIC FIELD
L. R. O. Storey and L. Cairo *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 289-293 refs Sponsored by UK. Sci. Res. Council. (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13568# Institut d'Aeronomie Spatiale de Belgique, Brussels.
A MICROSCOPIC DESCRIPTION OF INTERPENETRATED PLASMA REGIONS
M. A. Roth *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 295-309 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13569# Institut fuer Weltraumforschung, Graz (Austria). Oesterreichische Akademie der Wissenschaften.
SOLUTION OF THE CHAPMAN-FERRARO PROBLEM WITHIN TWO DIMENSIONS
H. Ruckner and H. Biernat *In* ESA Magnetospheric Boundary Layer Aug. 1979 p 311-314 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13570# Technische Hochschule, Darmstadt (West Germany). Angewandte Geophysik.
INFLUENCE OF THE INTERPLANETARY MAGNETIC FIELD ON THE POSITION OF THE DAYSIDE MAGNETOPAUSE
G. H. Voigt *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 315-321 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13571*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
RATES OF MASS, MOMENTUM, AND ENERGY TRANSFER AT THE MAGNETOPAUSE
T. W. Hill *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 325-332 refs (For primary document see N80-13529 04-42)
(Grants NGR-44-006-137; NSF ATM-77-12619)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

N80-13572# Imperial Coll. of Science and Technology, London (England).
THE FORMATION AND PROPERTIES OF BOUNDARY LAYERS DOWNSTREAM FROM NEUTRAL LINES IN AN OPEN MAGNETOSPHERE
S. W. H. Cowley *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 333-342 refs Sponsored by UK Sci. Res. Council. (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13573# California Univ., Los Angeles. Dept. of Atmospheric Sciences.
ANTIPARALLEL MERGING, THE HALF-WAVE RECTIFIER RESPONSE OF THE MAGNETOSPHERE, AND CONVECTION
N. U. Crooker *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 343-348 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13574*# Rice Univ., Houston, Tex.
INTERNAL MAGNETOSPHERIC PLASMA FLOW
J. W. Freeman *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 351-355 refs Co-sponsored by NASA and NSF (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

N80-13575*# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
MAGNETOPAUSE KELVIN-HELMHOLTZ INSTABILITY
D. J. Southwood *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 357-364 refs (For primary document see N80-13529 04-42)
(Contract NAS5-20064; Grant NSF ATM-74-23464)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

N80-13576# Institut d'Aeronomie Spatiale de Belgique, Brussels.
IMPULSIVE PENETRATION OF SOLAR WIND AND ITS EFFECTS ON THE UPPER ATMOSPHERE
J. Lemaire *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 365-373 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13577*# Texas Univ. at Dallas, Richardson. Center for Space Sciences.
IMPULSIVE PENETRATION AND VISCOUS INTERACTION
W. J. Heikkila *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 375-380 refs Co-sponsored by NSF (For primary document see N80-13529 04-42)
(Grant NsG-5085)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

N80-13578# Southampton Univ. (England). Dept. of Physics.
TOWARDS A MORE QUANTITATIVE UNDERSTANDING OF DAYSIDE MAGNETOPAUSE CURRENTS
M. A. Saunders and M. J. Rycroft *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 381-384 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13579# Max-Planck-Institut fuer Aeronomie, Lindau Uber Northeim (West Germany).
INTERACTION BETWEEN THE MAGNETOSPHERIC BOUNDARY LAYERS AND THE IONOSPHERE
V. M. Vasyliunas *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 387-393 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13580# Max-Planck-Institut fuer Extraterrestrische Physik, Garching (West Germany).
THEORY OF THE LOW ATTITUDE BOUNDARY LAYER
B. U. Oe. Sonnerup *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 395-397 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13581*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ELECTROMAGNETIC STRUCTURE OF THE MAGNETOPAUSE AND BOUNDARY LAYER
B. U. O. Sonnerup (Max-Planck-Inst. fuer Extraterrestrische Phys., Garching, West Germany) and B. G. Ledley *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 401-410 refs (For primary document see N80-13529 04-42)
(Grants NsG-7292; NSF ATM-74-08223)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 04A

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N80-13740 Florida State Univ., Gainesville.
THE INFLUENCE OF THERMAL FRONTS UPON THE SOLUTIONS OF AN ANALYTICAL MODEL OF A MIDLATITUDE WAVE-CYCLONE Ph.D. Thesis
Richard Donald Grotjahn 1979 171 p
Avail: Univ. Microfilms Order No. 7926755

The stability and structure of wave-like perturbations imbedded in a zonal flow containing vertical and horizontal shear are examined via an analytical model of a midlatitude cyclone. The stability, structure, and energetics of some solutions are discussed. As the intensity of the front increases, the growth rate increases for most wavenumbers. As the meridional width of the east-west aligned frontal zone diminishes, the most unstable wavelength shifts to shorter wavelengths and the fastest moving wave shifts to longer wavelengths. The amplitude of the structure is increased in the vicinity of the front and the meridional scale of the eddy is decreased in proportion to the scale of the prescribed front. The phase of the eddy pressure field is changed by the front in two ways. Barotropically unstable tilts are introduced and the westward tilt with height is decreased in the upper region and increased in the lower part by the horizontal shear. Examination of the energy conversions indicates that the two instability mechanisms inhibit each other. Dissert. Abstr.

N80-13741 Florida State Univ., Gainesville.
THE IMPORTANCE OF EDDY MOMENTUM FLUX IN THE DYNAMICS OF A HURRICANE: A NUMERICAL APPROACH Ph.D. Thesis
Malakondayya Challa 1979 130 p
Avail: Univ. Microfilms Order No. 7926728

An axisymmetric hurricane model with parameterized horizontal eddy fluxes of momentum is used to study the efficacy of eddy momentum fluxes in enhancing or suppressing the development and intensification of a hurricane. The results show that there are appreciable differences in the rate of intensification and in the final intensity of the model hurricane with and without eddy fluxes of momentum and that the intensification rate and ultimate intensity of a hurricane depends on the distribution of eddy momentum flux. In one experiment with a supercritical sea surface temperature, but with a negative eddy momentum flux, the initial vortex decayed and the initial low pressure center filled. The amount of control that the eddy momentum flux appears to have on the information or development of a hurricane is revealed. Dissert. Abstr.

N80-13742*# Oklahoma Univ., Norman.
JET TRANSPORT PERFORMANCE IN THUNDERSTORM WIND SHEAR CONDITIONS
John McCarthy, Edward F. Blick, and Randall R. Bensch Dec. 1979 63 p refs
(Contract NAS8-31377)
(NASA-CR-3207) Avail: NTIS HC A04/MF A01 CSCL 04B

Several hours of three dimensional wind data were collected in the thunderstorm approach-to-landing environment, using an instrumented Queen Air airplane. These data were used as input to a numerical simulation of aircraft response, concentrating on fixed-stick assumptions, while the aircraft simulated an instrument landing systems approach. Output included airspeed, vertical displacement, pitch angle, and a special approach deterioration

parameter. Theory and the results of approximately 1000 simulations indicated that about 20 percent of the cases contained serious wind shear conditions capable of causing a critical deterioration of the approach. In particular, the presence of high energy at the airplane's phugoid frequency was found to have a deleterious effect on approach quality. Oscillations of the horizontal wind at the phugoid frequency were found to have a more serious effect than vertical wind. A simulation of Eastern flight 66, which crashed at JFK in 1975, served to illustrate the points of the research. A concept of a real-time wind shear detector was outlined utilizing these results. Author

N80-13743*# Universities Space Research Association, Boulder, Colo.
WARM/COLD CLOUD PROCESSES Progress Report, 1 Jul. - 30 Sep. 1979
David A. Bowdle 30 Sep. 1979 26 p
(Contract NAS8-33131)
(NASA-CR-161336) Avail: NTIS HC A03/MF A01 CSCL 04B

Technical assistance continued in support of the Atmospheric Cloud Physics Laboratory is discussed. A study of factors affecting warm cloud formation showed that the time of formation during an arbitrary expansion is independent of carrier gas composition for ideal gases and independent of aerosol concentration for low concentrations of very small aerosols. Equipment and procedures for gravimetric evaluation of a precision saturator were laboratory tested. A numerical feasibility study was conducted for the stable levitation of charged solution droplets by an electric field in a one-g static diffusion chamber. The concept, operating principles, applications, limits, and sensitivity of the levitation technique are discussed. A.R.H.

N80-13744# Naval Research Lab., Washington, D. C.
NUMERICAL SIMULATION OF SUDDEN STRATOSPHERIC WARNINGS
Mark R. Schoberl and Darrell F. Strobel 26 Jun. 1979 75 p refs Sponsored in part by NASA
(WF52551792)
(NASA-CR-162505; AD-A071249; NRL-MR-4013) Avail: NTIS HC A04/MF A01 CSCL 04/2

A mechanistic, quasigeostrophic model with a self consistent calculation of the mean zonal flow was used to numerically simulate sudden stratospheric warmings generated by a single zonal harmonic (m) planetary wave. The development of a warming depends critically on the two factors which govern the transmission of planetary waves to the upper stratosphere: (1) the strength of the westerly winds in the lower stratosphere and (2) the magnitude of wave damping in the same region. Major warmings can only develop when the prewarming lower stratospheric winds are strong. Damping controls the maximum amplitude that a warming can attain and the time constant for its growth rate. Long term integrations with a steady forced m = 1 wave show that the mean flow evolves to a steady, asymptotic state with net cooling in the polar mesosphere from planetary waves. But steady m = 2 forcing leads to multiple generation of warmings which are similar to stratospheric vacillations. GRA

N80-13745# National Climatic Center, Asheville, N. C.
NATIONAL WIND DATA INDEX Final Report
Michael J. Changery Dec. 1978 231 p ref
(Contract EX-76-A-29-1041; E(49-26)-1041)
(HCP/T1041-01) Avail: NTIS HC A11/MF A01

A guide is presented for the identification of all locations in the United States with original wind data in any form that have been archived at the National Climatic Center. DOE

N80-13746# National Oceanic and Atmospheric Administration, Washington, D. C. National Weather Service.
AUTOMATED PREDICTION OF BOUNDARY LAYER WINDS AND TURBULENCE FOR THE SAVANNAH RIVER LABORATORY Final Report
David B. Gilhousen 1979 26 p refs
(Contract EY-77-A-09-1007)
(NOAA-TR-NWS-1007-1) Avail: NTIS HC A03/MF A01

The development and testing of Model Output Statistics (MOS) wind forecasts for an instrumented TV tower located near the Savannah River Laboratory (SRL) is presented. These forecasts could serve as valuable guidance in case of a nuclear incident at the installation. Several applications of the MOS technique are reported. In addition to forecasts of wind speed and direction, forecasts of two turbulence parameters were developed and evaluated. These turbulence parameters were the standard deviations of both the azimuth and elevation of the wind. These quantities help to estimate the amount of plume and puff spread. Tests were conducted to see if MOS forecasts of each element were capable of resolving differences between tower levels. MOS forecasts were compared to two other types of forecasts to determine their utility. Short range persistence forecasts served as one type of comparison since SRL uses the current observed winds in their diffusion models. Climatology forecasts served as the other comparison set. DOE

N80-13747# Northrop Services, Inc., Huntsville, Ala.
SOLAR-CLIMACTIC STATISTICAL STUDY
Roger E. Bray Feb. 1979 570 p refs
(Contract EG-77-C-01-4016)
(HCP/T4016-01/2) Avail: NTIS HC A24/MF A01

Historic data (SOLMET) at 26 National Weather Service stations reporting hourly solar insolation and collateral meteorological information were examined to provide an estimate of future trends. Selected insolation and wind power conditions were investigated for their occurrence and persistence for defined periods of time on a monthly basis. Diurnal variations of wind power were also considered. Probability estimates of solar insolation and wind power, alone and in combination, occurring and persisting at or above specified thresholds are presented. Selected probability data for each station are presented graphically, and comprehensive plots for all stations are provided. Information of this nature is intended as an aid to preliminary planning activities for the design of solar and wind energy utilization systems. DOE

N80-13748# World Meteorological Organization, Geneva (Switzerland).
REPORT OF THE FIFTH PLANNING MEETING FOR THE MONSOON EXPERIMENT (MONEX). PART 1: WINTER MONEX Global Atmospheric Research Programme
1979 90 p refs Conf. held at Manila, 16-20 Oct. 1978 Prepared jointly with ICSU, Rome
(GARP-Spec-Rept-30) Avail: NTIS HC A05/MF A01; WMO, Geneva SWFR 15

The organization and implementation of the winter Monsoon Experiment conducted by GARP is reported on. Topics discussed include the winter MONEX observing system, national commitments to winter MONEX, activities of the International MONEX Management Center, and planned research activities during and after winter MONEX. The implementation and operations plan for the experiment, involving ship operations, aircraft operations, and satellite observations as well as overall data management plans, is also presented. Author (ESA)

N80-13749# Royal Netherlands Meteorological Inst., De Bilt. Div. of Oceanographic Research.
METEOROLOGICAL AND OCEANOGRAPHIC OBSERVATIONS ON BOARD DUTCH LIGHT VESSELS AND THE LIGHT PLATFORM 'GOEREE' IN THE NORTH SEA
1979 167 p In DUTCH and ENGLISH
(KNMI-141-26) Avail: NTIS HC A08/MF A01; Royal Netherlands Meteorol. Inst., De Bilt, Fl 17.50

Three-hourly meteorological and wave observations, hourly current observations, and salinity measurements made in the North Sea off the coast of the Netherlands are presented in tabular form. The methods of observation and the instruments used are briefly described. Parameters reported include air pressure, air temperature and wet bulb temperature, sea water temperature, amount of precipitation, and duration of precipitation and fog. Also provided are data on current, salinity, the fraction of the celestial dome covered by clouds, horizontal visibility, and comparison of past ad present weather for the observation interval. Direction of wind and sea, wind force, period of sea and swell as well as height of sea and swell are also shown. Author (ESA)

N80-13750# Royal Netherlands Meteorological Inst., De Bilt.
METEOROLOGICAL OBSERVATIONS IN THE NETHER-

LANDS FOR 1977 Annual Report
1979 74 p In DUTCH and ENGLISH
(KNMI-97-129) Avail: NTIS HC A04/MF A01; Royal Netherlands Meteorol. Inst., De Bilt, Fl 17.50

The results of observations made at 45 meteorological stations in the Netherlands are given in tabular form. Information on the exact location of the stations as well as the instruments used is also given. Meteorological parameters reported on include air pressure, wind direction, wind velocity, temperature, and relative humidity. Vapor pressure, global radiation, sunshine, amount of precipitation, and duration of precipitation are summarized as well for the reporting period. Author (ESA)

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N80-13751 Virginia Polytechnic Inst. and State Univ., Blacksburg.
THE OCEAN TIDE AND WAVES BENEATH THE ROSS ICE SHELF, ANTARCTICA Ph.D. Thesis
Richard Turl Williams, III 1979 211 p
Avail: Univ. Microfilms Order No. 7925388

Widely spaced tidal gravity records were used to determine the spatial and temporal variation of the ocean tide beneath the Ross Ice Shelf. Cotidal coamplitude maps were drawn for the six greatest harmonic constituents of the tide. These are K1, P1, O1, M2, S2, and N2. The tide is principally diurnal, the diurnal amplitudes being roughly 3 times longer than the semidiurnals. Theoretical calculations of the tidal current indicate that the semidiurnal and diurnal current constituents have roughly the same amplitude. Waves having periods shorter than 20 min were observed in the ice shelf. These were identified as flexural waves that are generated by the action of the ocean swell on the northern edge of the shelf. The observed speed of these waves was predicted within the uncertainty of the measurement by the classical flexural wave theory. Dissert. Abstr.

N80-13752 Columbia Univ., New York.
ISOPYCNAL TRANSPORT BY THE ANTARCTIC CIRCUMPOLAR CURRENT AND THE ANTARCTIC INFLUENCE AT INTERMEDIATE WATER DENSITIES Ph.D. Thesis
Eugene John Molinelli 1979 216 p
Avail: Univ. Microfilms Order No. 7924943

The precepts of isopycnal analysis are reviewed and found applicable to the problem of Antarctic intermediate water (AAIW) formation. A probable precursor to this major water mass is found in the isohaline thermoclines of the southeast Pacific which occur with the densities of Atlantic AAIW. Distributions of depth, potential temperature, salinity, dissolved oxygen, and silicate on the 27.25 sigma sub 0 surface in the Southern Ocean are mapped using nearly 4,000 hydrographic stations. The distributions are interpreted to be consistent with the flow discerned from the isopycnal transports. An error analysis for isopycnal transport calculations is derived. Dissert. Abstr.

N80-13753*# EG and G Washington Analytical Services Center, Riverdale, Md.
A STUDY OF POSSIBLE SEA STATE INFORMATION IN THE SAMPLE AND HOLD GATE STATISTICS FOR THE GEOS-3 SATELLITE ALTIMETER Final Report
W. T. Wells, K. L. Borman, R. D. Mitchell (RCA/Missile and Surface Radar Div., Moorestown, N.J.), and D. J. Dempsey (RCA/Missile and Surface Radar Div., Moorestown, N.J.) Sep. 1979 36 p refs
(Contract NAS6-2497)
(NASA-CR-156858) Avail: NTIS HC A03/MF A01 CSCL 08C

The statistical variations in the sample gate outputs of the GEOS-3 satellite altimeter were studied for possible sea state information. After examination of a large number of statistical characteristics of the altimeter waveforms, it was found that the best sea predictor for H-1/3 in the range of 0 to 3 meters was the 75th percentile of sample and hold gate number 11. R.E.S.

N80-13754# Mississippi State Univ., State College.
THE ANALYSIS OF SEDIMENT SAMPLES FOR HYDROCARBONS Final Report
Lewis Raymond Brown and Charles Douglas Minchew 30 Oct. 1978 72 p
(Contract DOT-CG-81-76-1476)
(AD-A073822; USCG-D-46-79; CGR/DC-12/79) Avail: NTIS HC A04/MF A01 CSCL 08/8

This document is a report on the hydrocarbon content of 1380 individual surficial samples obtained from areas in the vicinity of three proposed Deep Water Port (DWP) Sites in the Gulf of Mexico during six cruises taken between 1975 and 1978. The samples were analyzed using 2 different LC-fluorescent methods, one of which was selective for petrogenic hydrocarbons and one of which detected both petrogenic and biogenic hydrocarbons. Additionally, nutrient chemical analyses and microbiological analyses were performed on sediment obtained during the first two cruises. All data were evaluated statistically and discussed in terms of sources of inputs, effect on season, and significance for formulating an overall monitoring program for the DWP sites. The results of this study suggest that analysis for both petrogenic and biogenic hydrocarbons should be undertaken in order to more accurately reflect the sources of seasonal variation in hydrocarbon levels at sites of interest. A method of displaying the data is illustrated and discussed. It allows rapid comparisons of the hydrocarbon content of sediments from the various stations. GRA

N80-13755# Woods Hole Oceanographic Institution, Mass.
A COMPILATION OF MOORED CURRENT METER AND WIND RECORDER DATA. VOLUME 18: JASIN 1978, MOORINGS 651-653
Susan Tarbell, Melbourne G. Briscoe, and Robert A. Weller Jul. 1979 236 p refs
(Contracts N00014-76-C-0197; N00014-75-C-0152; Grant NSF OCE-77-25803; NR Proj. 083-400; NR Proj. 083-005)
(AD-A073581; WHOI-79-65-Vol-18) Avail: NTIS HC A11/MF A01 CSCL 08/10

Summaries of current and temperature measurements from three moorings in the 1978 Joint Air-Sea Interaction Project (JASIN) are presented; the moorings are WHOI/JASIN numbers 651/W1, 652/W2, and 653/W3. The instruments were either Vector Averaging Current Meters (VACM), Scripps Institution of Oceanography Vector Measuring Currents Meters (VMCM), or Neil Brown Acoustic Current Meters (ACM). Displays include time series, histograms, progressive vector diagrams, scatter plots, and spectra; statistics are given for the entire deployment period (some 40 days) and for each 5 day segment. Additional measurements include pressure and vertical temperature gradient. Wind records and other meteorological observations from one of the moorings are given, as well as partial wind records from another JASIN mooring (H2). GRA

N80-13756# Naval Postgraduate School, Monterey, Calif.
TROPICAL DISTURBANCES IN AN OCEANIC GENERAL CIRCULATION MODEL WITH SEASONAL FORCING M.S. Thesis
Richard Duane LeRoy Jun. 1979 68 p refs
(AD-A073602) Avail: NTIS HC A04/MF A01 CSCL 08/3

A ten-level primitive equation ocean circulation model is used to investigate the formation and propagation of baroclinic wavelike responses to annual variations in wind stress forcing. At 12.2 N a thermal response to Ekman pumping is observed to be in phase across the entire longitudinal extent of the model Pacific Ocean. A zonal fluctuation in interior ocean current systems is also suggested. Eastern boundary disturbances not related to local forcing are observed to propagate poleward. At 6.1 N, main thermocline displacements are observed to propagate westward as the result of vertical advection induced by Ekman pumping. Surface layer temperature disturbances also exist which are produced by meridional advection of mean temperature (colder to the south) by surface Ekman currents. Eastern boundary disturbances also exist at this latitude and extend to a deeper level. All disturbances observed in this investigation are considered to be permanent features of the model circulation. Grid size limitations preclude detailed investigation of the observed boundary disturbances with this model. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N80-13757*# Florida Inst. of Tech., Melbourne. School of Science and Engineering.
PHOTOSYNTHETIC CARBON REDUCTION BY SEAGRASSES EXPOSED TO ULTRAVIOLET A RADIATION Final Report
15 Sep. 1979 38 p refs
(Contract NAS9-15846)
(NASA-CR-160397) Avail: NTIS HC A03/MF A01 CSCL 06C

The seagrasses Halophila engelmannii, Halodule wrightii, and Syringodium filiforme were examined for their intrinsic sensitivity to ultraviolet-A-UV-A and ultraviolet-B-UV-B radiation. The effect of UV-A on photosynthetically active radiation (PAR) was also determined. Ultraviolet-A and ultraviolet-B were studied with emphasis on the greater respective environmental consequence in terms of seagrass distribution and abundance. Results indicate that an intrinsic sensitivity to UV-A alone is apparent only in Halophila, while net photosynthesis in Halodule and Syringodium seems unaffected by the level of UV-A provided. The sensitivity of Halophila to UV-A in the absense of (PAR) indicates that the photosynthetic reaction does not need to be in operation for damage to occur. Other significant results are reported. R.C.T.

N80-13758*# Texas A&M Univ., College Station. Dept. of Plant Sciences.
A PRELIMINARY RESEARCH PLAN FOR DEVELOPMENT OF A PHOTOSYNTHETIC LINK IN A CLOSED ECOLOGICAL LIFE SUPPORT SYSTEM Final Report
Page W. Morgan Nov. 1979 135 p refs
(Contract NAS9-15873)
(NASA-CR-160399; Rept-79-556) Avail: NTIS HC A07/MF A01 CSCL 06C

The use of higher plants in a closed ecological life support system for long duration space missions involving large numbers of people is considered. The approach to planning and developing both the habitat for a long term space mission and closed ecological life support systems are discussed with emphasis on environmental compatibility and integrated systems design. The requirements of photosynthetic processes are summarized and evaluated in terms of their availability within a closed ecological life support environment. Specific references are recommended as a data base for future research on this topic. R.C.T.

N80-13759*# General Electric Co., Houston, Tex.
SYSTEM PARAMETERS FOR ERYTHROPOIESIS CONTROL MODEL: COMPARISON OF NORMAL VALUES IN HUMAN AND MOUSE MODEL
15 Dec. 1979 29 p refs
(Contract NAS9-15487)
(NASA-CR-160401; TIR-741-LSP-8024) Avail: NTIS HC A03/MF A01 CSCL 06C

The computer model for erythropoietic control was adapted to the mouse system by altering system parameters originally given for the human to those which more realistically represent the mouse. Parameter values were obtained from a variety of literature sources. Using the mouse model, the mouse was studied as a potential experimental model for spaceflight. Simulation studies of dehydration and hypoxia were performed. A comparison of system parameters for the mouse and human models is presented. Aside from the obvious differences expected in fluid volumes, blood flows and metabolic rates, larger differences were observed in the following: erythrocyte life span, erythropoietin half-life, and normal arterial pO2. R.E.S.

N80-13760# State Univ. of New York, Stony Brook.
DETERMINING BIOLOGICAL FINE STRUCTURE BY DIFFERENTIAL ABSORPTION OF SOFT X-RAY
B. J. Panessa-Warren and J. B. Warren (BNL) Jun. 1979 23 p refs Presented at the Conf. on Ultrasoft X-Ray Microscopy, N.Y., 13 Jun. 1979 Submitted for publication
(Contract EY-76-C-02-0016)
(BNL-26282; CONF-790674-3) Avail: NTIS HC A02/MF A01

The use of soft X-ray contact microscopy in examining histo-chemically treated human tissue embedded in plastic and exposed as unstained thin sections is demonstrated. Preliminary data revealed that the histochemical reaction product, and the unstained biological fine structure of the surrounding tissues can be clearly imaged. Hydrated proteoglycan aggregates were examined. Proteoglycans are an essential component of the organic matrix of cartilage, and play a primary role in the retention and maintenance of extracellular water. To avoid any artifacts due to the introduction of exogeneous materials, and examine the proteoglycan aggregates in their hydrated, natural configuration, contact X-ray images of isolated proteoglycan aggregates in water were made. DOE

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N80-13761 Johns Hopkins Univ., Baltimore, Md.
THE EFFECTS OF CONTEXT ON THE STRUCTURE OF PAIN Ph.D. Thesis
Mark Harold Bradshaw 1979 138 p
Avail: Univ. Microfilms Order No. 7924603

Multidimensional scaling (MDS) was used to determine whether the structure of a set of pain descriptors varied as a function of the area of the body to which those descriptors referred. Three body areas (head, arms and legs, and torso) were chosen, and a set of 13 words were found which were judged by subjects to be highly applicable to the description of pain in all three body areas. These words, plus a few body-area-specific words, were used as stimuli in four MDS studies. In each of the studies pain descriptors were judged in the context of a specific body area. It was concluded that differences in the structure of the pain descriptors across different body areas were minimal to nonexistent. Thus, this research supports the view that a single taxonomy of pain descriptors can represent the major pain qualities in different parts of the body and that MDS is a good method for establishing such a taxonomy. Dissert. Abstr.

N80-13762* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 199
Nov. 1979 37 p
(NASA-SP-7011(199)) Avail: NTIS HC E03 CSCL 06E

This bibliography lists 82 reports, articles, and other documents introduced into the NASA scientific and technical information system in October 1979. Author

N80-13763 Virginia Univ., Charlottesville.
MODELING STUDIES OF THE PRESSURE-FLOW RELATIONSHIP OF THE CENTRAL AIRWAYS Ph.D. Thesis
David Burkman Reynolds 1978 249 p
Avail: Univ. Microfilms Order No. 7928032

The spacing of junctions that control the pressure flow relation of the bronchial tree was investigated. A mathematical model simulating these relations was developed. Airway models included single bifurcations, bifurcating networks, and a latex airway reproduction of a dog lung. The total flow rate of water and aqueous solutions of sucrose and sodium carboxymethyl cellulose and the static pressure at selected locations of the airway models was measured for steady and unsteady, inspiratory, and expiratory flow corresponding to tracheal Reynolds number in the range 1000-10,000. A dimensionless form of the Rohrer equation was used to simulate the data and to partition the total loss into that of an individual bifurcation. By appropriate sealing relationships, the results with aqueous solutions were extended to the flow of air. Dissert. Abstr.

N80-13764# Clemson Univ., S.C. Coll. of Engineering.
RESUSCITATION FROM HYPOTHERMIA: A LITERATURE REVIEW Final Report, 17 Jan. 1978 - 14 Feb. 1979
R. Michael Harnett, Fred R. Sias, and James R. Pruitt 14 Feb. 1979 64 p refs

(Contract DOT-CG-72074-A)
(AD-A069093; USCG-D-26-79) Avail: NTIS HC A04/MF A01 CSCL 06/5

This report summarizes medical and scientific aspects of the general literature debate over rapid versus slow rewarming and selected specific rewarming approaches. The specific approaches were selected largely on the basis of being difficult to evaluate with in vivo experiments with human subjects. Findings in basic medical literature, research reports and clinical medical literature are analyzed leading to recommendations of the suitability of each specific therapy for use as a first-aid treatment in the field. GRA

N80-13765# Army Research Inst. of Environmental Medicine, Natick, Mass.

DEVELOPMENT AND DESCRIPTION OF A DEVICE FOR STATIC STRENGTH MEASUREMENT IN THE ARMED FORCES EXAMINATION AND ENTRANCE STATION

Joseph Knapik, Dennis Kowal, Patrick Riley, James Wright, and Michael Saoco 9 Jan. 1979 44 p refs
(AD-A068684; USARIEM-T-2/79) Avail: NTIS HC A03/MF A01 CSCL 06/14

A device for muscular strength measurement designed for possible use in the AFEES is presented. Muscle groups involving the upper body, legs and trunk, were selected for measurement as being most representative of the functional muscle groups most relevant to the Army's needs. The isometric (static) mode of testing was selected due to its simplicity of administration, reliability and reduced susceptibility to motivational influences. Biomechanical factors including subject-machine couplings, anatomical angles and minimization of synkinetic movement patterns are considered. The apparatus and calibration techniques are described. Standardized postures, anatomical angles and instructions are included. Reliability coefficients of 0.97, 0.92 and 0.83 were obtained for the upper body, legs and trunk respectively. Descriptive statistics and histograms for a representative population are included. GRA

N80-13766# Coast Guard, Washington, D.C. Office of Research and Development.

RELIABILITY, VALIDITY AND APPLICATION OF AN IMPROVED SCALE FOR ASSESSMENT OF MOTION SICKNESS SEVERITY Final Report, Apr. 1978 - May 1979

S. F. Wiker, R. S. Kennedy (Naval Aviation Med. Res. Lab., New Orleans), M. E. McCauley (Human Performance Res., Inc., Goleta, Calif.), and R. L. Pepper (Naval Ocean Systems center, Kaila, Hawaii) May 1979 29 p refs
(AD-A069130; USCG-D-29-79) Avail: NTIS HC A03/MF A01 CSCL 06/5

Three sea going vessels steamed side-by-side through slight seas off the coast of Oahu, Hawaii. A four-hour octagon was transmitted twice each day for three consecutive days while motion sickness symptomatology was recorded from eighteen enlisted men who alternated among the vessels. Dramatic differences in illness severity were obtained, whether comparisons were made using objective evidence of vomiting episodes, or subjective reporting of symptoms on questionnaires. Reliability of this scoring method was excellent ($r = .95$). In addition to face and construct validity, evidence is presented of the predictive validity of the scoring method in a separate octogonal steaming experiment; using a 95 ft Coast Guard Patrol Boat in an equivalent experimental paradigm. This study showed significant covariance between the magnitude of motion sickness symptomatology and the encounter direction of the vessel to the primary swell ($p < .01$). Additional significant correlations were found between sickness severity and test subject concentration, fatigue, urine production and urine specific gravity. The majority of these relationships would not have been disclosed had only the dichotomous criterion of vomit/nonvomit been employed in assessing motion sickness severity. Implications of these data as design criteria for marine vehicles are discussed. GRA

N80-13767# California Univ., Berkeley. Lawrence Berkeley Lab. Div. of Biology and Medicine.

EFFECTS OF IONIZING RADIATION ON THE LIGHT SENSING ELEMENTS OF THE RETINA Ph.D. Thesis

Michael J. Malachowski Jul. 1978 236 p refs
(Contract W-7405-eng-48)
(LBL-5683) Avail: NTIS HC A11/MF A01

Morphological and physiological effects of particles of high linear energy transfer on the retina, in comparison with X-ray effects were investigated. The particles used were accelerated atomic nuclei of helium, carbon, and neon at kinetic energies of several hundred MeV/nucleon. For morphological studies, scanning and transmission electron microscopy and light microscopy were used. Physiological studies consisted of autoradiographic data of the rate of incorporation of labeled protein in the structures (opsin) of the outer segment of visual cells. Structural changes were found in the nuclei, as well as the inner and outer segments of visual cells, rods and cones. At a low of dose of 10 rad, X-ray and helium had no statistically significant morphological effects, but carbon and neon beams did cause significant degeneration of individual cells, pointing to the existence of a linear dose effect relationship. Other significant results are reported. DOE

N80-13768# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).

APPARATUS FOR MEASUREMENT OF TISSUE COMPLIANCE Final Report

Wolfgang Gerhard, Wolfgang Hepp, and Karl-Frieder Sahm Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 60 p refs In GERMAN; ENGLISH summary
(Contracts BMFT-WRT-1076; DFVLR-BPT-01-00-096)
(BMFT-FB-W-78-05) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,60

It is supposed that the compliance of tissues under weightlessness produces changes in the distribution of fluids in the tissues which can be observed in space. These changes give rise to changes in the tissue thickness; analogous thickness variations can be produced by application of external pressure to tissue. A concept for measuring these variations in tissue thickness is studied. After a critical analysis of the experimental situation, possible procedures for thickness measurement are discussed. As a suitable procedure, an ultrasonic echo method was chosen which works with impulses similar to shock waves. For the application of pressure to the tissue a special pressure chamber was developed. Problems connected with coupling of the chamber and the ultrasonic probe to the tissue surface were solved. A laboratory test of the measuring equipment gives results which are reproducible and of adequate precision. Author (ESA)

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N80-13769*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EFFECT OF NOISE SPECTRA AND A LISTENING TASK UPON PASSENGER ANNOYANCE IN A HELICOPTER INTERIOR NOISE ENVIRONMENT

Sherman A. Clevenson and Jack D. Leatherwood Dec. 1979 26 p refs
(NASA-TP-1590; L-13233) Avail: NTIS HC A03/MF A01 CSCL 05I

The effects of helicopter interior noise on passenger annoyance were studied. Both reverie and listening situations were studied as well as the relative effectiveness of several descriptors (i.e., overall sound pressure level, A-weighted sound pressure level, and speech interference level) for quantifying annoyance response for these situations. The noise stimuli were based upon recordings of the interior noise of a civil helicopter research aircraft. These noises were presented at levels ranging from approximately 68 to 86 dB(A) with various gear clash tones selectively attenuated to give a range of spectra. Results indicated that annoyance during a listening condition is generally higher than annoyance during a reverie condition for corresponding interior noise environments. Attenuation of the planetary gear clash tone results in increases in listening performance but has negligible effect upon annoyance for a given noise level. The noise descriptor most effective for estimating annoyance response under conditions

of reverie and listening situations is shown to be the A-weighted sound pressure level. R.E.S.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N80-13770*# General Electric Co., Houston, Tex. Apollo Systems Dept.
ANALYSIS OF METABOLIC ENERGY UTILIZATION IN THE SKYLAB ASTRONAUTS
J. I. Leonard 19 Dec. 1977 97 p
(Contract NAS9-14523)
(NASA-CR-160402; TIR-741-MED-7018) Avail: NTIS HC A05/MF A01 CSCL 05H

Skylab biomedical data regarding man's metabolic processes for extended periods of weightlessness is presented. The data was used in an integrated metabolic balance analysis which included analysis of Skylab water balance, electrolyte balance, evaporative water loss, and body composition. A theoretical analysis of energy utilization in man is presented. The results of the analysis are presented in tabular and graphic format. R.E.S.

N80-13771*# General Electric Co., Houston, Tex. Apollo Systems Dept.
SKYLAB WATER BALANCE ERROR ANALYSIS
J. I. Leonard 5 May 1977 39 p refs
(Contract NAS9-14523)
(NASA-CR-160403; TIR-782-LSP-7006) Avail: NTIS HC A03/MF A01 CSCL 05H

Estimates of the precision of the net water balance were obtained for the entire Skylab preflight and inflight phases as well as for the first two weeks of flight. Quantitative estimates of both total sampling errors and instrumentation errors were obtained. It was shown that measurement error is minimal in comparison to biological variability and little can be gained from improvement in analytical accuracy. In addition, a propagation of error analysis demonstrated that total water balance error could be accounted for almost entirely by the errors associated with body mass changes. Errors due to interaction between terms in the water balance equation (covariances) represented less than 10% of the total error. Overall, the analysis provides evidence that daily measurements of body water changes obtained from the indirect balance technique are reasonable, precise, and relaible. The method is not biased toward net retention or loss. R.E.S.

N80-13772# Bendix Corp., Davenport, Iowa. Instruments and Life Support Div.
ANTI-SUFFOCATION VALVE BENDIX TYPE NO. 3267010-0101 Final Report
J. Mientus, R. Cramer, and J. Dunbar 16 Apr. 1979 26 p refs
(Contract N62269-76-C-0214)
(AD-A068927; NADC-79010-60) Avail: NTIS HC A03/MF A01 CSCL 06/11

The oxygen supply currently located in the RSSK (Rigid Seat Survival Kit) provides the aircrew member with an emergency source of oxygen in the event of an in-flight failure of the aircraft oxygen system, during parachute descent, or in the event of aircraft ditching. An inherent danger in the system is the suffocation of an unconscious aircrew member who cannot remove his mask in the event the emergency oxygen supply becomes depleted or is malfunctioning. The protection envelope currently provided the aircrew member will be greatly enhanced through the incorporation of an anti-suffocation valve, providing the capability of breathing ambient air when oxygen from the emergency supply is no longer available. The valve overcomes the danger of an aircrew member unknowingly breathing air during normal in-flight operation, and prevents the entrance of water during an underwater or flotation condition. GRA

N80-13773# ITT Electro-Optical Products Div., Roanoke, Va.
AVIATION NIGHT VISION GOGGLE Final Report, 13 Jul. 1977 - 16 Mar. 1979
Pete Hartman 29 Mar. 1979 54 p
(Contract DAAK70-77-C-0179)
(AD-A073296) Avail: NTIS HC A04/MF A01 CSCL 17/8

The intent of this program was to demonstrate the feasibility of a lightweight goggle which possessed a unique 'flip-up' capability and utilized the existing Generation II or (Gen III) lightweight image intensifier assembly. The contract consisted of the design, fabrication, test, and delivery of two Aviation Goggles with two minor design iterations. The contract modification consisted of retrofitting two sets of goggles with lightweight image intensifier. GRA

N80-13774# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Unternehmensbereich Raumfahrt.
SPACELAB ENVIRONMENT INVESTIGATION BY MASS SPECTROMETER Final Report
Gunther Kupfahl and Rolf Maisch Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 70 p refs In GERMAN; ENGLISH summary
(Contracts BMFT-WRT-1075; DFVLR-BPT-01-00-016)
(BMFT-FB-W-78-02) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14,50

The aptness of the extremely clean environment onboard Spacelab to scientific and technological experimentation is considered. The limitations of this cleanliness due to leakage and outgassing from the Shuttle-Spacelab system are defined. Contamination control, mandatory for certain missions, is described. The use of mass spectrometers, being best suited to this purpose, as measuring instruments is recommended. Type and preliminary specifications for this equipment are given. It is pointed out that this instrument can be used simultaneously for aeronomic research, because the undisturbed and contaminated atmosphere can be separated by an energy discriminator. A set of control mechanisms is suggested to cover at least one halfsphere of the space around is Spacelab. Author (ESA)

N80-13775# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
A FIELD OF VIEW SIMULATOR EQUIPPED FOR PERSPECTIVE TRANSFORMATION ON A TELEVISION RASTER [EIN SICHTSIMULATOR MIT PERSPEKTIVISCHER VERZEICHNUNG DES RASTERS VON FERNSEHBILDERN]
H. Heising Dec. 1977 78 p refs In GERMAN; ENGLISH summary
(FB-34) Avail: NTIS HC A05/MF A01; Forschungsinst. fuer Anthropotech., Meckenheim, West Ger. DM 10

For ergonomical investigations of visual simulation problems a system which simulates the outside visual environment as seen by an aircraft pilot was developed. Television technology was used for storage and display of moving images because of its low cost and technical maturity. High accuracy and fast computation requirements are accomplished with a specially built analog computing network which is described in detail. This visual simulation technique is applicable to a wide range of tasks and visual situations in which perspective transformations of images are desired. Author (ESA)

N80-13776# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
ON THE OPTIMIZATION OF SPRING ELASTICITY, DAMPING, AND INERTIA EFFECTS ON THE SPRING LOADING OF A CONTROL STICK [ZUR OPTIMIERUNG VON FEDER-, DAEMPFUNGS- UND MASSEANTEILEN BEIM BEWEGUNGSWIDERSTAND EINES LENKKNUEPPELS]
W. Krueger May 1978 41 p refs In GERMAN; ENGLISH summary
(FB-37) Avail: NTIS HC A03/MF A01; Forschungssinst. fuer Anthropotech., Meckenheim, West Germany DM 10

In manual control the performance of the human operator can be influenced by the design of controls. Deflection-resistance characteristics are of special interest due to the movement resistance of the control. In order to investigate several reaction forces of a joystick, a series of experiments was conducted. The optimal control forces as a combination of spring force (0, 1, 2, 3.5 N/cm) viscous damping (0, 0.2, 0.35 N/cm/sec), and inertia (0, 2 kg) were obtained. A second and third order tracking task (simplified longitudinal and lateral dynamics of an airplane) was

used. Results show that only spring force (1.0 to 3.5 N/cm), can improve tracking performance. Damping and inertia effects were negative using a low spring stiffness of 1.0 N/cm. Self adjusted stiffness by well trained subjects was 1.7 N/cm.
Author (ESA)

N80-13777# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
A COMPARISON OF CONTROL SIMULATORS HAVING FORCE INPUTS AND DISPLACEMENT FEEDBACK. APPLICATIONS TO THE MANUAL CONTROL OF UNDERWATER VEHICLES [UNTERSUCHLING EINES BEDIENELEMENTS MIT KRAFTEINGABE UND WEGRUECKMELDUNG BEI DER MANNELLEN LENKUNG VON UNTERWASSERFAHRZEUGEN]
H. E. Boller and W. Krueger May 1978 32 p refs In GERMAN; ENGLISH summary
(FB-38) Avail: NTIS HC A03/MF A01; Forschungsinst. fuer Anthropotech., Meckenheim, West Germany DM 10

In manual control, human operator performance can be improved by kinesthetic feedback of vehicle dynamic behavior. In a low-frequency system, the advantage of kinesthetic feedback may be reduced by slow system reactions. Two different single axis control yokes, each with the functional capability of either pure displacement inputs of force input with a displacement feedback as a kinesthetic display of vehicle response were compared. Eight subjects were used in controlling a simulated submarine while making several changes in depth. Results did not support a preference for the force yoke with a displacement feedback. It is recommended not to use this type of control device in steering such a one-axis low-frequency system.
Author (ESA)

N80-13778# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
ON THE PROBLEM OF SPRING LOADED RESISTANCE TO SIMPLE AND COMPLEX POSITIONING OF A CONTROL STICK [ZUM PROBLEM DES BEWEGUNGS- WIDERSTANDS BEI EINFACHEN UND KOMPLEXEN STELLBEWEGUNGEN DES ARMES]
G. Rothbauer Oct. 1978 150 p refs In GERMAN; ENGLISH summary
(FB-40) Avail: NTIS HC A07/MF A01; Forschungsinst. fuer Anthropotech., Meckenheim, West Germany DM 10

To provide good proprioceptive feedback in a manual control device for a designation task, spring resistance of a joystick was optimized by using the psychophysical method of cross modality matching. Designation with zero and first order systems showed that the coarse adjustment was insensitive to stick and certain task parameters, although it was influenced by some biomechanical parameters and the anticipated demands of the final control positioning. Only the more difficult fine adjustment is sensitive to parameter alteration and therefore suitable for optimization attempts. The strong centering of the stick by nonlinear degressive spring resistance facilitates fine adjustment. Through this, total adjustment time with the first order system is reduced by more than 30%, compared to a linear resistance. Tracking experiments confirm the usefulness and preference of nonlinear spring resistance. Author (ESA)

N80-13779# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
THE AUTOMOBILE DRIVING SIMULATOR FOR ANTHROPOGENIC RESEARCH
E. Donges Jul. 1978 48 p refs In GERMAN; ENGLISH summary uft der fahrsimulator des forschungsinstituts fuer anthropotechnik
(FB-41) Avail: NTIS HC A03/MF A01; Forschungsinst. fuer Anthropotech., Meckenheim, West Germany DM 10

The setup of a driving simulator which is used for the investigation of human behavior in guiding motor vehicles is described. The front part of a fully equipped car body serves as a mock-up for the driver. The simulation of lateral and longitudinal vehicle dynamics is based on simplified motion equations and characteristics implemented on a digital process computer. An electronic visual outside world simulation generates a synthetic, central perspective view of a two lane road according to vehicle motions. The driving noise is composed of simulated engine, tire, and wind noise. The simulator mock-up can be rotated in degrees of freedom (roll and pitch) by an electro-hydraulic servosystem. Steering wheel forces are provided by an electromechanical servosystem corresponding to a static characteristic with hysteresis. The data transfer between the simulator components, the simulation mode control, and data acquisition is coordinated by a digital process computer which also solves the dynamic equations of vehicle motion in real time. Author (ESA)

N80-13780# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
ON THE INTERACTION BETWEEN SYSTEM AND TASK PARAMETERS THROUGH CONTINUOUS MANUAL CONTROL [INTERAKTION VON SYSTEM- UND AUFGABENPARAMETERN BEI KONTINUIERLICHER MANUELLER REGFLUNG]
G. Rothbauer Mar. 1979 39 p refs In GERMAN; ENGLISH summary
(FB-42) Avail: NTIS HC A03/MF A01; Forschungsinst. fuer Anthropotech., Meckenheim, West Germany. DM 10

Experiments in pursuit tracking with a first order system were conducted. Tracking performance, depending on the forcing function bandwidth, the system parameters control gain and control spring resistance as well as their interactive influence, was investigated. These experiments, giving six subjects the possibility of self adjusting the system parameters according to the task, resulted in parameter settings which required an intraindividually constant average control force for the accomplishment of the task. It is noted that the average control deflection varied considerably. Results are interpreted according to the importance of proprioceptive force-feedback in continuous control. Author (ESA)

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N80-13781 Michigan Univ., Ann Arbor.
A STRUCTURED LOGICAL DATABASE DESIGN METHODOLOGY, VOLUMES 1 AND 2 Ph.D. Thesis
Beverly Katz Kahn 1979 458 p
Avail: Univ. Microfilms Order No. 7925171

Designing a data base is a difficult, complex and unstructured process. A methodology for improving that part of the data base design process that takes a set of many individual requirements specifications and transforms them into a single, consistent and complete logical data base structure for a specific data base management system is described. The logical data base design process proposed consists of sub processes which produce the

following outputs: (1) local information structure, (2) global information structure, (3) entity structure, (4) revised entity structure, and (5) logical data base structure. This decomposition of the data base design process provides a greater degree of data independence and more flexible data base than the traditional two-level decomposition. Dissert. Abstr.

N80-13782 Columbia Univ., New York.
A SPECIFICATION OF DATA STRUCTURES WITH APPLICATION TO DATA BASE SYSTEMS Ph.D. Thesis
Maurice Bach 1979 219 p
Avail: Univ. Microfilms Order No. 7924847

A 'universal' data base model was constructed in order to compare the efficiency of different data base systems. The descriptive language used is based on a fragment of first order logic without quantifiers but with free individual variables. The use of such a language has great advantages as it has a well understood syntax and semantics. Unfortunately, its disadvantages include its reliance on inductive definitions and the fact that it is not a compact language. The language was applied to the description of several constructs common to many programming languages. The language was also used to describe the different types of data bases which are used today, including relational, hierarchical and network data base systems. Procedures for translating the 'conceptual' data model to 'storage' models are presented. Dissert. Abstr.

N80-13783 Syracuse Univ., N. Y.
THE ANALYSIS OF PROCESSOR-TIME TRADE-OFF OPPORTUNITIES IN A RECONFIGURABLE MULTIPROCESSOR SYSTEM Ph.D. Thesis
Hendrik Spaanenburg 1979 145 p
Avail: Univ. Microfilms Order No. 7925601

The feasibility and attractiveness of a multimodality multiprocessor network are considered. The network is dynamically structurable into configuration modes that facilitate pipeline and parallel computations. The selection of structures made form a powerful set of computational alternatives. A distinction is made between the deterministic case where all relevant execution times are known, and the nondeterministic one where a certain amount of uncertainty is present. It is shown that in either case, the result is that a tradeoff opportunity exists between the number of processors used for a particular computation and the execution time involved. The exact shape of that tradeoff curve is a function of the accuracies of the assumptions involved. Dissert. Abstr.

N80-13784 Wayne State Univ., Detroit, Mich.
INTERCONNECTION NETWORKS IN MULTIPLE-PROCESSOR SYSTEMS Ph.D. Thesis
Chuan-lin Wu 1979 242 p
Avail: Univ. Microfilms Order No. 7921739

The methods for interconnecting a large number of functional units in a multiple processor system and the multistage interconnection networks were reviewed. The limitations of the conventional interconnection organizations were surveyed. Multistage interconnection networks which were proposed from significantly different viewpoints were studied. A wide variety of switching concepts and parameters, which a designer may have to encounter in planning and designing an interconnection network were summarized. A set of characteristics of interconnection networks for specifying the performance standard as well as the requirements of hardware facilities and communication protocols for cost effective implementations of interconnection networks were provided. A class of multistage interconnection networks was defined by introducing a baseline network and a condition of topological equivalence. Dissert. Abstr.

N80-13785 Washington Univ., Seattle.
THE APPLICATION OF FORMAL MODELS TO A FULLY ADAPTIVE GENERAL PURPOSE DIGITAL DATA COMPRESSION SYSTEM Ph.D. Thesis
George Branston Houston 1979 359 p
Avail: Univ. Microfilms Order No. 7927805

An efficient, practically realizable, general-purpose digital data compression system which can compress, in one pass, mixtures of data; achieve compression performance comparable to that of less general or less efficient systems; and can be used in applications where general compression systems were previously considered infeasible is presented. Formal models are used which capture essential similarities and differences between compression systems, and show how to decompose compression systems into practically useful primitive elements. They also enable a formal demonstration that integrity of the reconstructed data can be assured by imposing simple conditions on the primitive elements. Dissert. Abstr.

N80-13786 Washington Univ., Seattle.
A COMPILER DESIGN FOR MULTIPLE INDEPENDENT PROCESSOR COMPUTERS Ph.D. Thesis
Daniel Edward Lipkie 1979 200 p
Avail: Univ. Microfilms Order No. 7927831

A directed graph model for information flow in a multiple independent processor computer (MIP) is developed and used to present a compiler designed to run well on such a computer. The MIP compiler design is evaluated by performing trace driven simulations where data for driving the simulations is derived from the uniprocessor compiler. Simulation results show that the speedup in compilation due to concurrent separate compilation is linear in the number of processors available while the speedup due to concurrent multipass compilation is approximately logarithmic in the number of processors available. The selection of scheduling techniques is determined by the MIP computer's operational parameters, such as homogeneous or nonhomogeneous processors, and the cost of changing the process a processor is executing. Dissert. Abstr.

N80-13787 Washington Univ., Seattle.
PROCESSOR AND FILE ALLOCATION IN DISTRIBUTED DATA BASE SYSTEMS Ph.D. Thesis
Hugo Moorgat 1979 216 p
Avail: Univ. Microfilms Order No. 7927844

An integrated view of distributed computer networks, computer communications and distributed data base systems is provided. Design and operational issues of distributed data bases are classified and discussed in detail. Efforts to model distributed data bases are surveyed and critically reviewed. A taxonomy for distributed data base design optimization models is presented. A three-level decision model to determine optimal processor allocation, file allocation and transaction routing decisions is developed and formulated as a mixed integer linear program. Specialized algorithms based on Benders' decomposition are specified for this model. Dissert. Abstr.

N80-13788 Polytechnic Inst. of New York.
THE SELF-ORGANIZING DATA BASE Ph.D. Thesis
Marsha Moroh 1979 191 p
Avail: Univ. Microfilms Order No. 7920793

A relational data base design technique in which all relations are constructed dynamically is presented. Instead of a fixed structure in which different substructures are defined for different users, the relation structure described is constantly and automatically reorganized as new relationships are entered into the system. Thus, the single set of relations is derived from the various users' specifications and united in a single system view, and constantly changing to reflect current needs of users. A set of algorithms are described for synthesizing relations from functional dependencies by dynamic computation of the transitive closure and minimum covering set of relations. These algorithms form the core of an automated system which generates and manages many simultaneous differing views of the data, each of which incorporates the features of a conventional, statically-designed normalized relational data base. Dissert. Abstr.

N80-13789 Purdue Univ., Lafayette, Ind.
THE MODELING OF VIRTUAL MEMORY SYSTEMS Ph.D. Thesis
Peter J. Denning 1979 178 p
Avail: Univ. Microfilms Order No. 7926430

Approaches to modeling computing systems via queueing networks both analytic and discrete were considered. The models were of a generic virtual memory system comprising central processing unit(s), a paging device, an I/O system, and a source of jobs. The model of program behavior explicitly incorporates phase/transition and swapping behavior; its parameters were taken from real data. The analytic model was a multiclass queueing network capable of incorporating these different program states.

The model was used to compare three policies for reloading a program's resident set when the job is restarted after an inactive period. The assumptions used to transform program parameters into parameters of the queueing network model were studied. A discrete simulation model of the virtual memory system was compared with the analytic model. The results indicate that the simulator incorporates much more detail about memory management than does the analytic model. Dissert. Abstr.

N80-13790# Wright State Univ., Dayton, Ohio. Dept. of Computer Science.

PDP-11 COMPUTER MONITORING SYSTEM Final Report, 1 Apr. 1976 - 30 Nov. 1978

J. E. Brandeberry, L. A. Crum, R. D. Dixon, and C. B. Ross 17 Oct. 1978 86 p

(Contract F33615-76-C-1258; AF Proj. 2003)

(AD-A072966; AFAL-TR-78-192) Avail: NTIS HC A05/MF A01 CSCL 09/2

This report describes a hardware system for controlling and accounting for use of up to 15 PDP-11's with up to 700 users. The system functions much like a software accounting system on a large time-sharing system and is designed for compatibility with DEC system-10 accounting packages. The hardware includes an SBC-80/10 microcomputer interface located in each PDP-11. The interface requires one system unit in the PDP-11 box. The interface becomes 'bus master' when the PDP-11 is turned on. It remains 'bus master' until the PDP-11 user has correctly 'logged on' to the system through the console terminal. The accounting data and user identification are stored on a PDP-11/04 system which communicates with each SBC-80/10 microcomputer via a serial RS232 communications link. The user identification is generated in a DEC system-10 and transferred to the PDP-11/04 over a serial asynchronous communication link. Account data is periodically transferred to the DEC system-10 via the same communications path. GRA

N80-13791# Yale Univ., New Haven, Conn. Dept. of Computer Science.

THE TRANSFER OF INFORMATION AND AUTHORITY IN A PROTECTION SYSTEM

Matt Bishop and Lawrence Snyder Jul. 1979 34 p refs

(Contract N00014-75-C-0752)

(AD-A073370; RR-166) Avail: NTIS HC A03/MF A01 CSCL 09/2

We distinguish between the transfer of information and the transfer of authority, and extend the Take-Grant Model to describe the former. The conditions under which information (but not authority) might be transferred are given, one characterization using the rules for transferring information alone, and another combining them with the previously-developed rules for transferring authority. GRA

N80-13792# Massachusetts Inst. of Tech., Cambridge. Center for Information Systems Research.

USE OF VIRTUAL MACHINES IN THE DEVELOPMENT OF DECISION SUPPORT SYSTEMS Final Technical Report, Sep. 1977 - Jan. 1979

John J. Donovan, Stuart E. Madnick, Chat-Yu Lam, and Tarek K. Abdel-Hamid Jul. 1979 251 p refs

(Contract F30602-77-C-0205; AF Proj. 5581)

(AD-A073748; RADC-TR-79-187) Avail: NTIS HC A12/MF A01 CSCL 09/2

This effort is composed of several studies that have been conducted to investigate the development of a software programming environment for decision support systems using virtual machine technology as an integrating tool. The final report combines the efforts of Reports 1-5 and highlights the merits of virtual machine technology as a software engineering tool. Report 1 examines various strategies for interfacing virtual machines. Report 2 examines these strategies and utilizes the CIS System to demonstrate their applicability. Report 3 highlights the components of a Composite Information System (CIS). This system demonstrates multiple access to incompatible data bases using virtual machines. Report 4 utilizes the CIS system to demonstrate potential for enhancing decision-making in critical areas of SPO management. Finally, Report 5 develops the framework for a Composite Data System (COMPDATA). This system studies the interface problems of coordinating multiple-user access to multiple incompatible data base systems. GRA

N80-13793# California Univ., Livermore. Lawrence Livermore Lab.

SLIC: AN INTERACTIVE MESH GENERATOR FOR FINITE ELEMENT AND FINITE DIFFERENCE APPLICATION PROGRAMS

M. A. Gerhard and R. C. Greenlaw 11 May 1979 18 p refs Presented at Intern. Conf. on Structural Mech. in Reactor Tech., Berlin, 13 Aug. 1979

(Contract W-7405-eng-48)

(UCRL-81931; CONF-790802-15) Avail: NTIS HC A02/MF A01

An interactive mesh program which builds and plots two and three dimensional continuum meshes from interactive terminal or disc input is described. The user inputs coordinates for certain key points and enters commands which complete the description of the geometry. Entire surfaces and volumes are then generated from the geometric skeleton. The program allows the user to correct input errors and saves the corrected command list for later reuse. The mesh can be plotted on a video display at any stage of development to evaluate the work in progress. Output is in the form of an input file to a user-selected computer code. DOE

N80-13794# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.

EVALUATION OF A SIMULATION FRAME PROGRAM FOR THE EAI PACER 600 HYBRID-COMPUTER

Hans-Heinz Lange 1979 31 p refs

(DFVLR-Mitt-79-01) Avail: NTIS HC A03/MF A01

An example of a simulation program is given. It was developed for extended aircraft simulation problems, but it can be used in many simulation tasks. The computer used was a hybrid system with one analog console and two digital processors, EAI Pacer 600 Type. This program structure is compatible with other computer systems. Some operating features are pointed out being important for increasing the simulation power of the system in order to deal with more complex multivariable real time simulation problems are indicated. Author (ESA)

N80-13795# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).

THE USE OF A MICROPROCESSOR FOR THE MANIPULATION AND REPRESENTATION OF LARGE AMOUNTS OF DATA ON A COLOR TELEVISION MONITOR [EINSATZ EINES MIKROPROZESSORS BEI DER UEBERICHTSDARSTELLUNG UND MANIPULATION GROSSER DATENMENGEN AUF FARBFERNSEHMONITOREN]

M. Haeusing, K.-P. Holzhausen, and P. Wolf Sep. 1978 77 p In GERMAN; ENGLISH summary

(FB-39) Avail: NTIS HC A05/MF A01; Forschungsinst. fuer Anthropotech., Meckenheim, West Germany DM 10

A color raster scan display system which is composed of modules and which utilizes standard color TV monitors as display media is presented. The preprocessing of command and display data as well as control of man-system interaction via a terminal is performed by a microprocessor. Given the example of presenting large amounts of data as a two-dimensional color pattern, it is shown how display formats, associated display colors, and text can be manipulated in a very flexible manner. Author (ESA)

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N80-13796 North Carolina Univ. at Chapel Hill.

BUILDING EFFICIENT PASS-ORIENTED ATTRIBUTE GRAMMAR EVALUATORS Ph.D. Thesis

Diane Phylis Pozefsky 1979 247 p

Avail: Univ. Microfilms Order No. 7925956

Operations applicable to all attribute grammars are reviewed

including the identification and elimination of useless and local attributes, the removal of erasing productions from an attribute grammar, and methods of improving the set of semantic rules associated with a particular production. A subfamily of pass-oriented attribute grammar evaluators is identified whose evaluators can be produced easily by a single evaluator generator. Methods are then explored to improve the time and space requirements of the member evaluators. Improvements are made in the speed of the evaluators by eliminating the parse tree and controlling evaluation by files of calls. Storage improvements are made by identifying the useful life span of attributes, storing on a stack those that are only needed for a single pass, and dynamically allocating and freeing others. Profiles of attribute grammars for real languages are given to support the value of many of the features presented. Dissert. Abstr.

N80-13797 New York Univ., N. Y.
EXPRESSION CONTINUITY AND THE FORMAL DIFFERENTIATION OF ALGORITHMS Ph.D. Thesis
Robert Allan Paige 1979 386 p
Avail: Univ. Microfilms Order No. 7925508

Formal differentiation is a program optimization technique which generalizes the method of strength reduction and provides a convenient framework with which to implement a host of program transformations including 'iterator inversion'. This technique which captures a commonly occurring yet distinctive mechanism of program construction in which succinct algorithms involving costly repeated calculations are transformed into more efficient incremental versions, is described. Algorithms are presented which can implement formal differentiation transformations both automatically and semiautomatically for programming languages ranging from FORTRAN to SETL. A comprehensive semiautomatic implementation design for a restricted version of SETL called Subsetl is also presented. Dissert. Abstr.

N80-13798 New York Univ., N. Y.
COMPARISON OF DIRECT CODE GENERATION AND INTERMEDIATE LANGUAGE GENERATION FOR BOOTSTRAPPING THE MACHINE-INDEPENDENT COMPILER, LITTLE Ph.D. Thesis
Paul Bennett Schneck 1979 225 p
Avail: Univ. Microfilms Order No. 7925523

Two techniques for transporting the machine independent compiler, LITTLE, are compared. A code generator for the target machine is implemented and tested on the host machine and then used to compile the LITTLE compiler into a form suitable for execution on the target machine. In addition, the code generator for the host machine is replaced by a code generator for a hypothetical machine language and a translator is written and used to produce the target machine language from the intermediate language. Pitfalls in the implementation of machine independent compilers are discussed. It is concluded that the use of an intermediate language simplifies the transporting of a machine independent compiler with little or no penalty in performance. Dissert. Abstr.

N80-13799 California Univ., Santa Cruz.
GENERATING CORRECT PROGRAMS FROM LOGIC SPECIFICATIONS Ph.D. Thesis
Ruth Ellen Davis 1979 198 p
Avail: Univ. Microfilms Order No. 7924588

A system that translates logic specifications into an intermediate language and then generates programs from the intermediate form was implemented in MACLISP on a DEC KL10. The specification language and the intermediate language are described using a context free grammar for the syntax and an axiomatic specification of the semantics. The mapping from specification language to intermediate language is described and it is proven that this mapping preserves the axiomatic semantics of the specifications. The mapping from the intermediate language to LISP is also described and proven correct. The implementations for LISP and PASCAL are discussed and guidelines are given for adding more languages to the system. Dissert. Abstr.

N80-13800 Carnegie-Mellon Univ., Pittsburgh, Pa.
COMPUTATIONAL EXPERIMENTS WITH ZERO-ONE PROGRAMMING ALGORITHMS AND HEURISTICS Ph.D. Thesis
Clarence H. Martin 1979 291 p
Avail: Univ. Microfilms Order No. 7925020

The development and computional testing of approaches to the solution of zero-one programming problems of general structure are discussed. Aspects of one or more of the three principal methods for solving zero-one programs, that is, enumeration, cutting planes, and heuristics are examined. The pivot and compliment procedure, a heuistic for finding approximate solutions to pure zero-one programs is introduced. Partitioning strategies for zero-one programs are developed. A cutting approach that uses disjunctive cutting planes generated by a branch and bound procedure is reported. An enumeration procedure based on cross branching is summarized. Two mathematical programming codes were expanded. Dissert. Abstr.

N80-13801 North Carolina State Univ. at Raleigh.
PARALLEL INTERACTIVE PROCESSING IN SHADED COLOR GRAPHICS Ph.D. Thesis
Stavros Boinodiris 1979 133 p
Avail: Univ. Microfilms Order No. 7923035

Computing systems dealing with the parallel processing of multidimensional primatives are investigated. Interlinked investigations were executed to find an appropriate structure with modular independence. The various facets of an orderly decomposition of a system into a set of independent subsystems and the problems of optimizing such a decomposition were examined. The choice of a structure with the greatest modular independence among hierarchical structures was studied. Results are reported. Dissert. Abstr.

N80-13802 Pennsylvania Univ., Philadelphia.
REAL-TIME EMULATION OF HARDWARE Ph.D. Thesis
Christian Lenz Cesar 1979 431 p
Avail: Univ. Microfilms Order No. 7928115

An approach is described for translating a description of a random-logic into microprocessor code that can execute fast enough to satisfy the hard real-time constraints imposed by the surrounding environment. This approach involves solving problems in different areas of computer and management sciences. In the area of hardware description languages, concepts and models are introduced for the systematic proceduralization of a nonprocedural language and give algorithms for this purpose. In the area of job-scheduling, a classical job-scheduling problem is extended by adding another precedence-type constraint on jobs and discussing its solution. Dissert. Abstr.

N80-13803 Carnegie-Mellon Univ., Pittsburgh, Pa.
PERFORMANCE MEASUREMENT AND ANALYSIS OF CERTAIN SEARCH ALGORITHMS Ph.D. Thesis
John Gary Gaschnig 1979 330 p
Avail: Univ. Microfilms Order No. 7925014

The methodology of analysis of algorithms to study certain combinatorial problems and search algorithms originating predominantly in the AI literature is discussed. The methodology is extended to include experiments in a complementary role. Experimental and analytic techniques are combined to measure and to predict the performance of the A* best first search algorithm, which solves path finding problems defined in terms of finite strongly connected graphs. Experimental results for a second problem domain are reported. Dissert. Abstr.

N80-13804 Washington Univ., Seattle.
BOUNDED NONDETERMINISM AND THE PARALLEL PARSING OF CONTEXT-FREE LANGUAGES Ph.D. Thesis
Paul Douglass Frank 1979 407 p
Avail: Univ. Microfilms Order No. 7927785

Several concepts of bounds on the amount of nondeterminism used in computations are proposed. A tree-like structure (a computation tree), and four different restrictions on the structures of such computation trees a:e introduced as bounds on nondeterminism itself; they are called the chain bound, the path bound, the width bound, and the read bound. The applications of these bounds on nondeterminism to three well known models of computation are explored in depth. Pushdown automata (PDA's) are considered in their role as recognizers of context free languages. Based on the degree of nondeterminism required in PDA computations, several infinite hierarchies of languages which fall in the gap between the deterministic context free languages

and the class of all context free languages are established. Decidability questions relating to bounds on nondeterminism for PDA's are also examined. Dissert. Abstr.

N80-13805 Washington Univ., Seattle.
THE DESIGN AND EVALUATION OF ALGORITHMS FOR PARALLEL PROCESSING Ph.D. Thesis
Carla Jean Ellis 1979 206 p
Avail: Univ. Microfilms Order No. 7927773

Modeling tools and design techniques to aid in developing correct parallel algorithms for multiple instruction stream - multiple data stream type multiprocessors were investigated. A design methodology based on the use of a graph model for parallel computation is described and a variety of parallelization techniques which can be applied to existing sequential solutions are illustrated. A major consideration is the impact of shared data structures on these on these methods for designing highly concurrent software. Two extensive case studies are presented. The first study focuses on the use of a model as a design tool. An extension of Petri Nets is employed in the modeling of an existing sequential compiler. The model contributes to an understanding of the sequential program and serves to identify conflicts in proposed parallel versions. The compiler is then modified to operate as a pipeline of three processes and its performance is measured. Simulation experiments indicate a speedup improvement of 2 to 1 and thus confirm the feasibility of this approach. Dissert. Abstr.

N80-13806 Northwestern Univ., Evanston, Ill.
EFFECT OF PROGRAM MODIFICATIONS ON SOFTWARE PERFORMANCE Ph.D. Thesis
James Samuel Collofello 1979 208 p
Avail: Univ. Microfilms Order No. 7927319

The possible ripple effect of software modifications during the maintenance phase on the performance of the system is analyzed. A maintenance technique for predicting which performance requirements in the system may be affected by a proposed modification is developed. Mechanisms for the propagation of performance changes from one part of the system to another are identified. Performance attributes and critical software sections are also reported. Dissert. Abstr.

N80-13807 Northeastern Univ., Boston, Mass.
ADAPTIVE ALGORITHMS FOR REDUCTION OF INTERCHANNEL AND INTERSYMBOL INTERFERENCE IN DIGITAL COMMUNICATIONS Ph.D. Thesis
Howard Edward Nichols 1979 167 p
Avail: Univ. Microfilms Order No. 7923539

The problem of digital communication in a communication system where the primary limitation on the error performance is due to interchannel interference and intersymbol interference is considered. A number of adaptive algorithms are described as potential solutions to this problem. These algorithms may be broadly classified into two categories: (1) algorithms based on a minimum mean square error (MSE) criterion; and (2) algorithms based on a maximum likelihood detection (MLD) criterion. The MSE algorithms include both linear algorithms and nonlinear decision feedback equalization algorithms. The MLD algorithms are all nonlinear including both a MLD symbol detection algorithm for memoryless channels and a multichannel generalization of maximum likelihood sequence estimation. Performance results are presented for each algorithm in terms of the residual MSE (as appropriate) and the probability of bit error. Dissert. Abstr.

N80-13808 Wisconsin Univ. - Madison.
SUPERLINEARLY GLOBALLY CONVERGENT ALGORITHMS FOR NONLINEAR PROGRAMMING VIA SEQUENTIAL LINEAR PROGRAMS Ph.D. Thesis
Jerome Lawrence Kreuser 1979 211 p
Avail: Univ. Microfilms Order No. 7922813

Superlinearly globally convergent algorithms which solve nonlinear programming problems by solving a sequence of linear programming problems are presented. Algorithms are first developed for the minimization of a class of nondifferentiable functions using the convex function, the optimality function, and the descent direction. A generalized convergence theorem and a rate of convergence theorem are given. It is then shown that the subproblem which uses the convex approximation to determine descent directions can be solved as a linear programming problem. Classes of algorithms are proposed for the solution of general nonlinear programming problems and nonlinear systems of equalities and inequalities by reformulating the problem as the minimum of a nondifferentiable function. Dissert. Abstr.

N80-13809 Yale Univ., New Haven, Conn.
THE COMPLEXITY OF THE MAXIMUM SUBGRAPH PROBLEM Ph.D. Thesis
John Murchie Lewis 1979 101 p
Avail: Univ. Microfilms Order No. 7927636

The conditions that imply a problem to be NP-complete are described. A class of problems termed maximum subgraph problems are dealt with. Several infinite subclasses of these problems are defined. For each subclass, a general reduction scheme that allows any member of the subclass to be proved NP-complete is given. It was concluded that the maximum subgraph problem for a property is complete for NP if the property can be defined by a set of forbidden subgraphs having one of the following forms: (1) the forbidden subgraphs are all biconnected; (2) the forbidden subgraphs are all connected, and the set is finite; (3) the forbidden subgraphs are all homeomorphic from some connected graph; (4) the forbidden subgraphs are all connected, and one has a vertex of degree one; and (5) there is a single forbidden subgraph. Dissert. Abstr.

N80-13810 Maryland Univ., College Park.
HEURISTIC APPROACHES TO THE DECOMPOSITION OF SPARSE MATRICES Ph.D. Thesis
George Francis Lowe 1979 169 p
Avail: Univ. Microfilms Order No. 7926517

Heuristic algorithms were developed for several large sparse matrices problems. These algorithms are presented along with extensive computational tests and comparisons with the classical algorithms. Several theoretical results pertaining to those problems are also developed. Dissert. Abstr.

N80-13811 Northwestern Univ., Evanston, Ill.
ON SOME GRAPH-THEORETIC PROBLEMS IN PROGRAM TESTING Ph.D. Thesis
Simeon Christos Ntafos 1979 90 p
Avail: Univ. Microfilms Order No. 7927414

Various path cover problems arising in program testing are discussed. Dilworth's theorem for acyclic digraphs is generalized and two methods for finding a minimum path cover for the vertices (or the edges) of a digraph are given. The notions of required pairs and required paths are introduced to model interactions among code segments. It is shown that finding a minimum path cover for a set of required pairs is NP-hard. Other constrained path problems dealing with must pairs, must paths, and impossible paths are considered and their complexities are discussed. Then, structured digraphs are introduced and a labelling procedure which characterizes structured digraphs is described. The minimum path cover problem and the required pair and must pair problems are treated for an important family of structured digraphs. Dissert. Abstr.

N80-13812 Cornell Univ., Ithaca, N. Y.
VERIFICATION OF ENCAPSULATED IMPLEMENTATIONS OF ALGEBRAICALLY SPECIFIED DATA TYPES Ph.D. Thesis
Patrick Kirkpatrick Orr 1979 163 p
Avail: Univ. Microfilms Order No. 7926942

A simple programming language that supports encapsulation is presented with a method for verifying encapsulated type definitions with respect to algebraic specifications of those types, and an axiomatic system for verifying programs that use correct implementations of algebraically specified data types. An interpretation of theorems derivable from an algebraic specification that interprets those theorems as axiomatic formulas relating variables in the programming language is given. This interpretation was used to derive a set of verification conditions for an encapsulation of a type from an algebraic specification of that type. Significant results are reported. Dissert. Abstr.

N80-13813 California Univ., Los Angeles.
MEASUREMENT, MODELING AND MANAGEMENT OF PHASED PROGRAM BEHAVIOR Ph.D. Thesis

Douglas Richard Partridge 1979 388 p.
Avail: Univ. Microfilms Order No. 7926053

Phase level program behavior, its relationship to storage hierarchy performance, and its direct utilization by storage management techniques were explored. A cluster analysis procedure for partitioning program reference strings into phases was developed and demonstrated using recorded address traces from three separate programs. Characteristics of the detected phases were reported. A class of generative program behavior models based on the cluster analysis procedure was formulated and an instance validated for each of three programs using trace analysis techniques. Application of these models to the analysis of main memory management and cache replacement algorithms was demonstrated. Other applications were suggested.
Dissert. Abstr.

N80-13814*# Pennsylvania State Univ., University Park. Materials Research Lab.
AN INVESTIGATION OF OPTIMIZATION TECHNIQUES FOR DRAWING COMPUTER GRAPHICS DISPLAYS Final Report
Frederick R. Stocker [1979] 39 p
(Grant NsG-1328)
(NASA-CR-162509) Avail: NTIS HC A03/MF A01 CSCL 09B

Techniques for reducing vector data plotting time are studied. The choice of tolerances in optimization and the application of optimization to plots produced on real time interactive display devices are discussed. All results are developed relative to plotting packages and support hardware so that results are useful in real world situations. K.L.

N80-13815*# Lockheed Electronics Co., Houston, Tex. Systems and Service Div.
SPACELAB INTERFACE DEVELOPMENT TESTS. SOFTWARE DESCRIPTION
J. W. Akers Aug. 1979 36 p
(Contract NAS9-15800)
(NASA-CR-160394; JSC-16193; LEC-13703) Avail: NTIS HC A03/MF A01 CSCL 09B

The software requirements for the Spacelab Interface Development Tests are described. The software operates in two modes. The multiplexer-demultiplexer mode transmits operator-controlled information to the Spacelab. The pulse coded modulation (PCM) mode records and displays operator selected PCM data for visual analysis. R.C.T.

N80-13816*# Lockheed Electronics Co., Houston, Tex.
AS-BUILT DESIGN SPECIFICATION FOR CAMS DEVELOPMENT DOT DATA SYSTEM (CDDDS)
Oscar Wehmanen Sep. 1979 159 p ref
(Contract NAS9-15800)
(NASA-CR-160395; LEC-14055; JSC-16253) Avail: NTIS HC A08/MF A01 CSCL 09B

The CAMS development dot data system is described. Listings and flow charts of the eight programs used to maintain the data base and the 15 subroutines used in FORTRAN programs to process the data are presented. K.L.

N80-13817# University of Southern California, Los Angeles. Dept. of Aerospace Engineering.
SOFTWARE FOR NONLINEAR FILTERING
R. S. Bucy, F. Ghovanlou, A. J. Mallinckrodt (Communications Res. Lab., Santa Ana, Calif.), and K. D. Senne (MIT, Lincoln Lab., Lexington, Mass.) Jun. 1979 134 p refs
(Contract F44620-76-C-0085; Grant AF-AFOSR-3100-76; AF Proj. 2305; AF Proj. 2304)
(AD-A073051; USCAE-53-4514-1787; USCAE-53-4514-1792; AFOSR-79-0923TR) Avail: NTIS HC A07/MF A01 CSCL 09/2

As part of a continuing search for the ideal architecture for performing the computations required to realize a non-linear filter, we have developed software for various machines over the past ten years. A description of the latest software is given in (1), while (2), (3), and (4) are useful for background information on the non-linear filtering problem as well as comments about software efficiencies relevant to various machines. We started our studies over 10 years ago using the CDC 6600 at the Aerospace Corporation and Kirkland AFB, and continuing at Eglin AFB, see (4). At the Institute for Advanced Computation, we gained access to the ILLIAC IV and of ICASE, NASA Langley, the Star 100, see (2). Access to the Cray was obtained through Cray Research and later NCAR. Experiments on the AP120B array processor were possible because of the acquisition of one here at USC used in conjunction with a PDP 11-55. GRA

N80-13818# Union Coll., Schenectady, N.Y. Inst. of Administration and Management.
SEQUENTIAL ANALYSIS OF VARIANCE: MONTE CARLO SIMULATION, MULTIVARIATE NORMAL APPROXIMATION, AND ROBUSTNESS Final Report, 1 Jun. 1977 - 1 Aug. 1979
Robert W. Miller 1 Aug. 1979 161 p refs
(Contract N00014-77-C-0438)
(AD-A072629; AES-7907) Avail: NTIS HC A08/MF A01 CSCL 12/1

Monte Carlo simulation and a multivariate normal approximation are used to find the OC and ASN of the sequential analysis of variance test. It is shown that the SANOVA test is remarkably robust. GRA

N80-13819# Polytechnic Inst. of New York, Brooklyn. Dept. of Electrical Engineering and Electrophysics.
SUMMARY OF TECHNICAL PROGRESS, INVESTIGATION OF SOFTWARE MODELS Interim Technical Report, 1 Jan. 1978 - 31 Jan. 1979
Martin L. Shooman and Henry Ruston Jul. 1979 43 p refs
(Contract F30602-78-C-0057; AF Proj. 2304)
(AD-A073639; POLY-EE-78-052; RADC-TR-79-188) Avail: NTIS HC A03/MF A01 CSCL 09/2

This interim report summarizes the research performed by Polytechnic Institute of New York for Rome Air Development Center. The principal topics covered are (1) software test models and implementation of automated test drivers to force-execute every program path, (2) development of new measures of program complexity based upon information theory, (3) models of software management and organizational structure, and (4) statistical measures relating the probability of finding a program error to the testing of that program. GRA

N80-13820# Honeywell, Inc., Minneapolis, Minn.
PRELIMINARY REFERENCE MANUAL FOR THE GREEN PROGRAMMING LANGUAGE: A LANGUAGE DESIGNED IN ACCORDANCE WITH THE IRONMAN REQUIREMENTS
15 Apr. 1978 84 p refs
(Contract MDA903-77-C-0331)
(AD-A073661) Avail: NTIS HC A05/MF A01 CSCL 09/2

This report describes the Green language. Designed in accordance with the Ironman requirements of the Department of Defense, the Green language represents a new attempt to combine classical language features with features often found only in specialized languages. These include facilities for handling exceptional conditions, parallel processing, representation specifications for data, encapsulated definitions, low level input-output, and access to system dependent parameters. GRA

N80-13821# Science Applications, Inc., Englewood, Colo.
AN EXPLORATORY STUDY OF THE COGNITIVE STRUCTURES UNDERLYING THE COMPREHENSION OF SOFTWARE DESIGN PROBLEMS Technical Report, 3 Oct. 1977 - 3 Dec. 1978
Michael E. Atwood, Althea A. Turner, H. Rudy Ramsey, and Jean Nichols Hooper Jul. 1978 61 p refs
(Contract DAHC19-78-C-0005)
(AD-A073727; SAI-79-100-DEN; ARI-TR-392) Avail: NTIS HC A04/MF A01 CSCL 09/2

An experiment was conducted to evaluate a framework for the study of software complexity and comprehension. Basic to this framework is the concept that a person's knowledge of, and experience with, software design affects that person's ability to comprehend a software problem and its potential solutions. Past research on software complexity and comprehensibility has largely been based on the assumption that complexity is a function of surface properties, such as variable names and flow of control. Such measures, however, ignore the effects of experience. Research on expert-novice differences in problems solving

suggests that experts possess a large number of previously developed knowledge structures, or schemata, that can be used to understand or solve the current problem. Research on text comprehension provides theoretical concepts and experimental paradigms that are useful in determining the structure and content of these experience-related schemata. GRA

N80-13822# Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROGRAMMABLE VIDEO DIGITIZING SYSTEM (PVDS). FUNCTIONAL DESCRIPTION AND PRELIMINARY SOFTWARE CONSIDERATIONS
Lawrie E. Eaton 5 Jun. 1979 145 p refs
(Contract F19628-78-C-0002; AF Proj. 2128)
(AD-A073756; ETS-46; ESD-TR-79-156) Avail: NTIS HC A07/MF A01 CSCL 09/2

A Programmable Video Digitizing System (PVDS) has been developed that will digitize selected portions of the return TV analog video from the Ebison camera at the GEODSS ETS. The digitized video can then be processed by either a microprocessor or a Modcomp Computer. From the data, the software may then determine object centroiding, night sky background calculations, signal/noise ratios and object rate/direction calculations for closed loop tracking. The system may also be used to process digitized data from future sensors, i.e., infrared or CCD. GRA

N80-13823# Naval Research Lab., Washington, D. C.
USING INTELLIGENT GRAPHICS TERMINALS IN REAL-TIME PROCESSING Interim Report
Daniel Steiger 24 Aug. 1979 15 p refs
(AD-A073760; AD-E000320; NRL-MR-4055) Avail: NTIS HC A02/MF A01 CSCL 09/2

At the Naval Research Laboratory intelligent graphics terminals are being utilized for real-time acquisition, storage, processing and display of oceanographic data when mini-computer systems are inappropriate. The intelligent graphic terminal is a well packaged, low cost, reliable and highly portable microcomputer system capable of performing many of the functions required of mini-computer systems. Discussed in the paper are methods of configuring, implementing and utilizing the intelligent graphics terminal for real-time oceanographic processing. GRA

N80-13824# Georgia Inst. of Tech., Atlanta. School of Industrial and Systems Engineering.
METHODS FOR FACTOR SCREENING IN COMPUTER SIMULATION EXPERIMENTS Final Report
Douglas C. Montgomery Mar. 1979 90 p refs
(Contract N00014-78-C-0312)
(AD-A073449) Avail: NTIS HC A05/MF A01 CSCL 09/2

The use of a computer simulation model may be viewed as an experiment in which a set of k input variables are combined to produce at least one output or response variable. As in any experimental situation, the design of a computer simulation experiment is important. In general, not all k input variables or factors will be equally important in their effect on the response variable(s). It is very common to find that only a subset, say g - k, of the original k factors are important in explaining the response. We usually do not know the value of g, or which g factors are important. The problem of experimentation and analysis to discover the size and composition of the subset of active factors g is called the factor screening problem. It is important to accurately identify the set of active factors. Failure to identify an active factor can result in serious bias in the analysis and conclusions drawn from the model, if that factor is subsequently ignored. Conversely, experimentation with negligible factors is undesirable as it consumes the resources of experimentation needlessly. This report contains a survey of the available statistical methodology useful in factor screening. It also discusses the relative merits of each approach, and provides guidelines for the development of a factor screening strategy. Several examples are presented that demonstrate the construction of factor screening experiments, and the interpretation of the results of such experiments. GRA

N80-13825# Utah Univ., Salt Lake City. Dept. of Computer Science.
SURFED: AN INTERACTIVE EDITOR FOR FREE-FORM SURFACES
R. Peter Dube (Maine Univ. at Orono), Gary J. Herron, Frank F. Little, and Richard F. Riesenfeld Mar. 1978 21 p refs
(Contract N00014-77-C-0157; Grant NSF MCS-74-13017)
(AD-A073424) Avail: NTIS HC A02/MF A01 CSCL 09/2

An editor is described for creating and modifying free-form surfaces. A modular system was developed in order to provide the researchers with a facility for communicating design ideas and new mathematical forms through an interactive graphical interface to a computer-based model. To achieve this it was necessary to invent a new graphical construct called a 'spider' for inputting 3-dimensional parameters. This experimental system has the essential features of a large-scale implementation, with the capability of utilizing many new surface forms that have not yet been tried in actual applications. GRA

N80-13826# Logicon, Inc., San Pedro, Calif.
RELIABLE MICROPROGRAMMING Final Technical Report, 7 Feb. 1978 - 6 Feb. 1979
Jane Radatz, Jeffrey Laub, and Gordon Hamachi Jul. 1979 350 p refs
(Contract F30602-78-C-0079; AF Proj. 2531)
(AD-A073454; DS-R79001; RADC-TR-79-173) Avail: NTIS HC A15/MF A01 CSCL 09/2

This report presents the results of the Reliable Microprogramming Contract. Current technology for microprogram verification is surveyed, and a set of microprogramming tools is proposed. These tools are evaluated, and a recommended set is identified. A functional description and a system specification are provided for each recommended tool. GRA

N80-13827# Oak Ridge National Lab., Tenn.
UTILITY LANGUAGE FOR THE NMFECC
H. R. Hicks 1978 7 p Presented at APS Plasma Phys. Meeting, Colorado Springs, Colo., 30 Oct. 1978
(Contract W-7405-eng-26)
(CONF-781053-4) Avail: NTIS HC A02/MF A01

Routines handling a small number of message lines are considered. Desirable characteristics proposed for a utility language include the following: ability to accept present input, human engineering, hardware independence, and similarity to other systems. These characteristics are discussed and examples are given. DOE

62 COMPUTER SYSTEMS

Includes computer networks.

N80-13828 Pennsylvania Univ., Philadelphia.
DISTRIBUTED DATABASE ORGANIZATION FOR OPTIMAL COMPUTER NETWORK RESPONSE TIME Ph.D. Thesis
Robert Michael Farrell 1979 180 p
Avail: Univ. Microfilms Order No. 7928126

The problem of optimizing response time of accesses to shared programs and data in a computer network is investigated. The key characteristics of a data sharing network are defined and its attributes are modelled. These are contrasted with the characteristics of communications (packet switching) or resource sharing networks. Two network optimization models are developed: a deterministic model and a stochastic model. Search algorithms are presented which determine optimal solutions to each model and assessments of the complexity of each algorithm are developed. Since the deterministic algorithms are exponential in complexity, heuristic algorithms of polynomial complexity are developed, to allow application of the models to very large computer networks. Applications of the models to distributed data bases, as well as to centralized data management systems in computer networks are discussed. Guidelines for selection of the proper model for an application, based on expected access traffic, are also presented. Dissert. Abstr.

N80-13829# Sandia Labs., Albuquerque, N. Mex.
TFILE: A USER CALLABLE TAPE FILE ARCHIVING SYSTEM FOR NOS
G. L. Lane Nov. 1978 41 p
(Contract EY-76-C-04-0789)
(SAND-78-2022) Avail: NTIS HC A03/MF A01

The TFILE operation is described along with information on the installation and maintenance procedures. DOE

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N80-13830 North Carolina Univ. at Chapel Hill.
QUEUES AND STORES WITH NONHOMOGENEOUS INPUT Ph.D. Thesis
Donna Katzman McClish 1979 173 p
Avail: Univ. Microfilms Order No. 7925945

It is shown that under a variety of circumstances, the presence of a periodic pattern of input is enough to insure that a quasi-limiting distribution of store content exists. For stores with nonhomogeneous Compound Poisson input and general release rule, a probabilistic approach is developed which allows equations to be written down easily for such quantities as the mean store content and the probability of an empty store. The formulas are series expansions in epsilon. A more in-depth look at the first two terms of the epsilon-expansion shows that for periodic phi(t), a general expression can be found for an approximation to the probability of an empty store. Applications of the formulas for stores with release rules r(x) = c, r(x) = a+bx and r(x) = alpha x are examined. For at least some instances of the M(t)/M/1 queue it is shown that the approximations developed are very good. The problem of a stochastic intensity function is also briefly considered. Dissert. Abstr.

N80-13831 Purdue Univ., Lafayette, Ind.
IMAGE SEGMENTATION BY STATISTICAL EDGE DETECTION AND SEQUENTIAL EDGE GROWING Ph.D. Thesis
Ahmad Salahi 1979 123 p
Avail: Univ. Microfilms Order No. 7926425

Algorithms are presented which effectively and efficiently segment the objects through detecting their boundaries. A two step procedure is developed to detect a clean and linear boundary for objects in pictures. Statistical hypotheses were used, testing to detect locations of local edges, and a sequential algorithm which moves around the boundary growing the edge by expanding and pruning local trees is described. In this way it removes the cracks, noise and parasitic branches. Dissert. Abstr.

N80-13832 Kentucky Univ., Lexington.
INFINITE SERVER QUEUING SYSTEMS WITH RENEWAL CLEARING AND RELATED MODELS Ph.D. Thesis
Donald Francis Linton 1979 87 p
Avail: Univ. Microfilms Order No. 7927692

Stochastic processes as related to infinite server queueing systems with renewal clearing are presented. A model is developed for an M/G infinity queue which removes the restriction of instantaneous restart at a renewal time by inserting a random setup time just after a clearing time. Customers are allowed to queue during the setup time period, but they all begin service at the end of the setup time period. The M/G infinite queueing system with renewal clearing is generalized to accommodate m < infinity customer types, one of which is served at a time. An extraneous Markov renewal process determines the successive type of customer served and the times at which changes in customer type are made. The relationship between this system and a system in a random environment is delineated. Dissert. Abstr.

N80-13833# Stanford Univ., Calif. Dept. of Operations Research.
TRANSIENTS EFFECTS IN M/G/1 QUEUES; AN EMPIRICAL INVESTIGATION
Michael R. Middleton Jun. 1979 161 p refs
(Contract N00014-76-C-0418; Grant NSF ENG-75-14847)
(AD-A073744; SU-TR-85; SU-TR-51) Avail: NTIS HC A08/MF A01 CSCL 12/1

This research provides numerical results for time-dependent expected server load (mean virtual waiting time) in single-server queues with Poisson arrivals and gamma distributed service times. The results are presented in tabular form to facilitate their use by practitioners involved in the study of operating systems. This research considers groups of server load processes whose parameters are selected so that the first and second moments of their net input processes are matched. An existing Laplace transform expression is employed to obtain transient expected server load at specified epochs. The tabulated results allow a comprehensive study of the error associated with using the Wiener process as an approximation of server load in queues. This study confirms that the Wiener process is always an upper bound and that the approximation is best for queues with a traffic intensity parameter near unity. The scaled results also indicate that the gamma input process and queueing process with deterministic service times provide tight lower and upper bounds, respectively, for expected server load in all queues with Poisson arrivals and gamma distributed service times. GRA

N80-13834# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
GAMMA-MINIMAX AND MINIMAX DECISION RULES FOR COMPARISON OF TREATMENTS WITH A CONTROL
Shanti S. Gupta and Woo-Chul Kim Aug. 1979 29 p refs
(Contract N00014-75-C-0455)
(AD-A073576; MMS-79-10) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper deals with the problem of partitioning treatments in comparison with a standard or control under a decision-theoretic formulation. It is assumed that pi sub i, the ith treatment population, is characterized by a random variable X sub i having strongly unimodal and symmetric density. Under the assumptions of a linear loss structure and incomplete prior information about theta sub i, i = 0,1,...,k, optimal selection rules are derived for classifying the treatments into superior, equivalent, or inferior groups. These Gamma-minimax rules are compared with Bayes rules for the normal means problem. It is shown that the Gamma-minimax rules compare quite favorably with the Bayes rules. Minimax rules are also derived for the same problem.GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N80-13835 Iowa Univ., Iowa City.
NUMERICAL SOLUTION OF TWO-DIMENSIONAL POTENTIAL THEORY PROBLEMS USING INTEGRAL EQUATION TECHNIQUES Ph.D. Thesis
Clayton Warren Miller 1979 215 p
Avail: Univ. Microfilms Order No. 7924505

The interior Dirichlet problem is solved numerically, using either a double-layer potential or a finite Taylor series. The approximate double-layer density for the potential is found from a Fredholm integral equation of the second kind by the Nystrom method. For boundaries possessing enough smoothness, rates of convergence are found for the double-layer density approximation and for the potential. The Taylor series approximation, and the error in the Taylor series, is computed using a potential which is a complex conjugate to the harmonic solution. The exterior Dirichlet problem, and the interior and exterior Neumann problems are solved by converting them numerically into interior Dirichlet problems using the Kelvin transformation. Error estimates derived for the interior Dirichlet problem are then applicable to these transformed problems. Dissert. Abstr.

N80-13836 Kentucky Univ., Lexington.
CONTROL KERNELS AND CONSTANT-RATE JUMP PROCESSES Ph.D. Thesis
James Allen Bain, Jr. 1979 171 p
Avail: Univ. Microfilms Order No. 7927664

Using control kernels, the expected payoff of a stochastic system as a conditional convolution of the payoff function against a control kernel is presented. A value function and optimality conditions are obtained. Control kernels were used to study continuous time dynamic programming by investigating a semi-group structure on a space of payoff functions. In the concrete example of completely observed (non-Markov) jump processes

which have a constant jump rate, all the control kernel axioms hold; moreover, control kernels allow discrete time dynamic programming to be adapted to prove the existence of optimal controls. Dissert. Abstr.

N80-13837 California Univ., San Diego.
NONLINEAR HARDY SPACES AND ELECTRICAL POWER TRANSFER Ph.D. Thesis
James Samuel Border 1979 107 p
Avail: Univ. Microfilms Order No. 7926691

An optimization problem which arises in the study of power transfer in electronic circuits and utilizes the elegant mathematical framework of finding the distance from a point in a manifold of functions to a smooth submanifold is presented. This general problem is considered and then looked at specifically in certain spaces of engineering interest and also some related spaces. These related spaces seem to be of interest in themselves and might be though of as nonlinear L superscript P spaces. In addition to power transfer, an important physical quantity in broadband matching is the input reflection. A condition is obtained for an arbitrary source to be able, through a matching network, to deliver at least a prescribed amount of power to a given load with at most a prescribed input reflection. Dissert. Abstr.

N80-13838 Missouri Univ. -Kansas City.
EVALUATION OF INTEGRALS WHOSE INTEGRANDS ARE OSCILLATORY AND SINGULAR Ph.D. Thesis
Bing-Yuan Ting 1979 142 p
Avail: Univ. Microfilms Order No. 7926598

Integrals whose integrands are oscillatory and contain singularities at the end points of the interval of integration are studied. Both f(x) and e(i theta x) can be expanded in series of orthogonal polynomials which are orthogonal over the interval of integration with respect to 2(x). There are two such expansions for f(x). One is an infinite series which follows from the usual orthogonality property. The other is a polynomial approximation plus a remainder. The relation between the coefficients in these representations are detailed and methods for the evaluation of these and for the coefficients in the expansion of e(i theta x) are analyzed. The formulas for G(theta) readily follow from the orthogonality property. Error analyses are provided. Several numerical examples are given. Dissert. Abstr.

N80-13839*# National Aeronautics and Space Administration, Washington, D. C.
MATHEMATICAL MODELING OF DIVERSE PHENOMENA
James C. Howard [1979] 402 p refs
(NASA-SP-437; LC-79-18506) Avail: NTIS HC A18/MF A01 CSCL 12A

Tensor calculus is applied to the formulation of mathematical models of diverse phenomena. Aeronautics, fluid dynamics, and cosmology are among the areas of application. The feasibility of combining tensor methods and computer capability to formulate problems is demonstrated. The techniques described are an attempt to simplify the formulation of mathematical models by reducing the modeling process to a series of routine operations, which can be performed either manually or by computer. J.M.S.

N80-13840*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex. Mission Planning and Analysis Div.
OPS MCC LEVEL B/C FORMULATION REQUIREMENTS: AREA TARGETS AND SPACE VOLUMES PROCESSOR
Mack J. Bishop, Jr. (Computer Sciences Corp.) Oct. 1979 140 p ref
(NASA-TM-80839; JSC-16029; Rept-79-FM-26-Rev-1) Avail: NTIS HC A07/MF A01 CSCL 12A

The level B/C mathematical specifications for the area targets and space volume processor (ATSVP) as well as the characteristics of the system are provided. The mathematical equation necessary to determine whether the spacecraft lies within the area target or space volume is presented. A semianalytical technique for predicting the acquisition of signal (AOS) and loss of signal (LOS) time periods is discussed. A functional overview of the ATSVP which includes an outline of the process required to determine precise AOS and LOS times are given. R.C.T.

N80-13841*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ANALYSIS OF NUMERICAL STABILITY AND AMPLIFICATION MATRICES: FOURTH-ORDER RUNGE-KUTTA METHODS
Euel W. Kennedy Sep. 1979 44 p refs
(NASA-TM-80836; JSC-16080; Rept-79-FM-32) Avail: NTIS HC A03/MF A01 CSCL 12A

Amplification matrices, numerical kernels, stable, and exponentially stable numerical solutions are examined. The various techniques involved in these concepts are applied to certain systems that have Jordan forms, which are nondiagonal, with particular interest in the case of imaginary or zero eigenvalues. R.C.T.

N80-13842# North Carolina Univ. at Chapel Hill.
A STARTING RULE FOR DATA COLLECTION IN QUEUEING SIMULATIONS
Veena G. Adlakha and George S. Fishman Aug. 1979 35 p refs
(Contract N00014-76-C-0302)
(AD-A073622; TR-79-3) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper proposes a rule for determining when to start collecting data in a queueing simulation. The rule is designed to reduce dependence between the empty (queue) and idle (servers) initial conditions and the collected sample record. The rule is an outgrowyh of earlier work by Fishman and Moore (1978) and relies on a comparison between a priori information on the activity level (traffic intensity) and a corresponding sample estimate computed during the course of simulation. Experiments with simulations of the M/M/c queue with c = 1,2,4 and rho = .7,.8,.9,.95 reveal that the rule reduces and in most cases removes the dependence on the empty and idle initial conditions. In particular, the rule begins data collection when the simulation is in a congested state or in the steady state. The rule is well behaved in that it has low probabilities of requiring long runs before data collection is started. Although our data suggests an association between the rule's performance and activity level, the performance is insensitive to variation in the number of servers. Since the rule is based upon the activity level, a parameter that frequently can be computed from the input parameters of the simulation, the rule is easily generalized to a wider class of queueing simulations. GRA

N80-13843# North Carolina Univ. at Chapel Hill.
A STOPPING RULE FOR DATA COLLECTION IN QUEUEING SIMULATIONS
Veena G. Adlakha and George S. Fishman Aug. 1979 33 p refs
(Contract N00014-76-C-0302)
(AD-A073624; TR-79-4) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper proposes a stopping rule (Rule 2) for terminating data collection in a queueing simulation experiment. The appeal of the rule lies in the fact that data collected in this way can be used to compute interval estimates with coverage rates that compare favorably with theoretically specified rates. The rule relies on a comparison between a priori information on the activity level (traffic intensity) p and a corresponding sample estimator computed during the course of simulation. GRA

N80-13844# Air Force Weapons Lab., Kirtland AFB, N. Mex.
COMPUTATIONAL EXPERIMENTS ON TWO ERROR ESTIMATION PROCEDURES FOR ORDINARY DIFFERENTIAL EQUATIONS Final Report
Bernard Epstein and D. Hicks Jun. 1979 78 p
(AF Proj. 9991)
(AD-A073768; AD-E200353; AFWL-TR-78-119) Avail: NTIS HC A05/MF A01 CSCL 12/1

Two error estimation procedures are compared. One is called the asymptotic error estimation procedure; the other, the error gradient estimation procedure. The theory underlying these procedures and the results of some numerical experiments are presented. GRA

N80-13845# Stanford Univ., Calif. Dept. of Statistics.
MAXIMUM LIKELIHOOD ESTIMATION OF THE AUTORE-

GRESSIVE COEFFICIENTS AND MOVING AVERAGE COVARIANCES OF VECTOR AUTOREGRESSIVE MOVING AVERAGE MODELS

Fereydoon Ahrabi Aug. 1979 94 p refs
(Contract N00014-75-C-0442; NR Proj. 042-034)
(AD-A073788; SU-TR-39) Avail: NTIS HC A05/MF A01 CSCL 12/1

The purpose of this paper is to derive asymptotically efficient estimates for the autoregressive matrix coefficients and moving average covariance matrices of the vector autoregressive moving average (VARMA) models in both time and frequency domains. To do this we shall apply the Newton-Raphson and scoring methods to the maximum likelihood equations derived from modified likelihood functions under the Gaussian Assumption. GRA

N80-13846# Naval Ocean Systems Center, San Diego, Calif.
LEAST SQUARES, ADAPTIVE-LATTICE ALGORITHMS Research Report, Jan. - Apr. 1979

J. D. Pack and E. H. Satorius Apr. 1979 32 p refs
(ZR0140811)
(AD-A073464; NOSC/TR-423) Avail: NTIS HC A03/MF A01 CSCL 12/1

Recently, it has been shown by Morf, Lee and others that least squares, adaptive algorithms may be implemented in a lattice form. This result is of considerable interest due to the rapid convergence characteristics of least squares algorithms as well as the important properties of lattice structures (such as high insensitivity to round-off noise). This report provides an explicit derivation of the joint real process, scalar least squares lattice algorithm. Also, a FORTRAN subroutine listing of the algorithm is presented. GRA

N80-13847# North Carolina Univ. at Chapel Hill. Dept. of Statistics.
SYSTEMS OF FREQUENCY CURVES GENERATED BY TRANSFORMATIONS OF LOGISTIC VARIABLES

P. R. Tadikamalla (Pittsburgh Univ., Pa.) and N. L. Johnson Jun. 1979 31 p refs
(Contract DAAG29-77-C-0035)
(AD-A073481; MMS-1226; ARO-14778.6-M) Avail: NTIS HC A03/MF A01 CSCL 12/1

The lognormal (S sub L, S sub B and S sub U) systems of frequency curves are obtained by three simple transformations of the normal curve. By applying the same transformations to the logistic, systems L sub L, L sub B and L sub U are obtained. Some properties of these systems, and their relation to the S systems, are set out. Tables to facilitate fitting L sub U curves by moments are presented. GRA

N80-13848# North Carolina Univ. at Chapel Hill. Dept. of Statistics.
EXTREME SAMPLE CENSORING PROBLEMS WITH MULTIVARIATE DATA, 2

N. L. Johnson Jul. 1979 23 p refs
(Contract DAAG29-77-C-0035)
(AD-A073563; MMS-1237; ARO-1478.7-M) Avail: NTIS HC A02/MF A01 CSCL 12/1

Indirect censoring is defined as the effect on observed variables of censoring on unobserved variables. Methods of testing for indirect censoring are discussed, and exemplified, using a bivariate Farlie-Gumbel-Morgenstern distribution. GRA

N80-13849# Oak Ridge National Lab., Tenn.
LECTURE NOTES ON ORDINARY DIFFERENTIAL EQUATIONS SOFTWARE, USER'S GUIDE FOR ODE, RKF45, GEAR AND EPISODE

J. A. Wenzel and R. E. Funderlic Aug. 1979 89 p
(Contract W-7405-eng-26)
(ORNL/CSD/TM-64) Avail: NTIS HC A05/MF A01

Four software packages for the numerical solution of initial value problems for systems of ordinary differential equations are demonstrated with sample problems and solutions. These packages are contained in the Core Library of Numerical Software of the Computer Sciences Division, ORNL. DOE

N80-13850# Los Alamos Scientific Lab., N. Mex.
APPLICATION OF THE BOSON POLYNOMIALS OF U(n) TO PHYSICAL PROBLEMS

J. D. Louck Sep. 1978 13 p refs Presented at Colloq. on Group Theoretical Methods in Phys., Austin, Tex., 11 Sep. 1978
(Contract W-7405-eng-36)
(LA-UR-78-2395; CONF-780970-1) Avail: NTIS HC A02/MF A01

A review is given of the properties of a general class of polynomials in the boson operators which were found useful for obtaining the explicit unitary irreducible representations of the unitary group itself, and to show how these same polynomials provide a unified approach for obtaining the explicit solutions to several classic problems in physics and chemistry. DOE

N80-13851*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOMINANT PARTITION METHOD

Robert M. Dixon (Morgan State Univ.) and Edward F. Redish (Maryland Univ., Coll. Park) Mar. 1979 26 p refs
(Contract EY-76-S-05-5126)
(NASA-TM-80778; ORO-5126-57) Avail: NTIS HC A03/MF A01 CSCL 12A

By use of the L'Huillier, Redish, and Tandy (LRT) wave function formalism, a partially connected method, the dominant partition method (DPM) is developed for obtaining few body reductions of the many body problem in the LRT and Bencze, Redish, and Sloan (BRS) formalisms. The DPM maps the many body problem to a fewer body one by using the criterion that the truncated formalism must be such that consistency with the full Schroedinger equation is preserved. The DPM is based on a class of new forms for the irreducible cluster potential, which is introduced in the LRT formalism. Connectivity is maintained with respect to all partitions containing a given partition, which is referred to as the dominant partition. Degrees of freedom corresponding to the breakup of one or more of the clusters of the dominant partition are treated in a disconnected manner. This approach for simplifying the complicated BRS equations is appropriate for physical problems where a few body reaction mechanism prevails. DOE

N80-13852# California Univ., Livermore. Lawrence Livermore Lab.
PIECEWISE CUBIC INTERPOLATION METHODS

F. N. Fritsch and R. E. Carlson Nov. 1978 39 p Presented at the SIAM 1978 Fall Meeting, Knoxville, Tenn., 1 Nov. 1978 Submitted for publication
(Contract W-7405-eng-48)
(UCRL-81230; CONF-781198-1) HC A03/MF A01

Interpolation of one dimensional data using piecewise cubic interpolants is considered. Methods are presented for modifying the derivative values in the Hermite representation in order to eliminate the bumps and wiggles that frequently plague the more common cubic spline or Akima interpolants. The resulting interpolant is C1, but generally not C2. DOE

N80-13853# Atomic Weapons Research Establishment, Aldermaston (England).
AN ITERATIVE UNFOLDING TECHNIQUE

P. E. Taylor London HMSO Apr. 1979 19 p refs
(ARWE-O-25/79; BR67686; ISBN-0-85518132-X) Avail: NTIS HC A02/MF A01; HMSO, London £1; PHI

A widely applicable iterative method for solving the folding equation S(t) = integral from - infinity to t, of f(t-k) Phi(K)dk' is described. Alternatively, the process may be regarded as a data smoothing technique. The method consists of using an arbitrary function g(t-k) in substitution of the unknown f(t-k) choosing appropriate parameter values for fitting to S(t), devising successive closer approximations by iteration. Solutions are also possible for nonlinear systems and in the closely related spectral unfolding problem. Two examples are shown. Author (ESA)

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N80-13854 Pittsburgh Univ., Pa.
AN EMPIRICAL POWER STUDY OF RECURSIVE OUTLIER

DETECTION PROCEDURES Ph.D. Thesis
Ram Baboo Jain 1979 505 p
Avail: Univ. Microfilms Order No. 7924721

The percentage points and their standard errors for five recursive procedures were computed by Monte Carlo methods for samples of size 20(5)50(10)100 for the presence of 1(1)5 outliers at alpha = .10, .05, .025, .01, and .005. The powers of these procedures were also studied under six different experimental situations formed by the combinations of the presence or absence of a masking effect with exact, under, and overspecification of the actual number of outliers present in the sample. The robustness of these procedures when the samples are drawn from the nonnormal symmetric distributions was also studied. The distributions used for the robustness study were the uniform and the double exponential distributions. The suitability of ESD both for flat and peaked symmetric distributions was established. Dissert. Abstr.

N80-13855 Virginia Polytechnic Inst. and State Univ., Blacksburg.
INVARIANT TESTS FOR SCALE PARAMETERS UNDER ELLIPTICAL SYMMETRY Ph.D. Thesis
Margaret Ann Chemilewski 1978 103 p
Avail: Univ. Microfilms Order No. 7924096

A number of standard tests for scale parameters is considered when the observations are not necessarily either Gaussian or independent. The distributions considered are the spherically symmetric vector laws and natural extensions of these to laws of random matrices. Using the principle of invariance, the invariant tests for certain hypotheses for all elliptically symmetric distributions are characterized. The particular problems treated are tests for the equality of k scale parameters, tests for the equality of k scale matrices, tests for sphericity, tests for block diagonal structure, tests for the uncorrelatedness of two variables within a set of m variables, and tests for the hypothesis of equi-correlatedness. In all cases except the last three, the null and nonnull distributions of invariant statistics are shown to be unique for all elliptically symmetric laws. Dissert. Abstr.

N80-13856 Wisconsin Univ. - Madison.
ESTIMATION OF SMOOTHING PARAMETERS TO SMOOTH NOISY DATA AND CONFIDENCE REGIONS FOR THE UNDERLYING FUNCTION Ph.D. Thesis
Heather Anne Lucas 1978 148 p
Avail: Univ. Microfilms Order No. 7918913

It is assumed that the function is a member of a periodic reproducing kernel Hilbert space of order m and the importance of determining the value of m from the data, if it is not otherwise known, is demonstrated. The choice of m for two classes of functions is discussed in detail and numerical results are given to support the theory. The problem of obtaining confidence regions for the true function is discussed. A confidence interval for the mean square error is derived. A confidence region for the function is defined in terms of the maximum absolute residual and a Bayesian approach for deriving its distribution is developed and is compared favorably with the usual approach. Dissert. Abstr.

N80-13857 Syracuse Univ., N. Y.
STATISTICAL ANALYSIS OF FINITE MIXTURES OF EXPONENTIAL AND WEIBULL DISTRIBUTIONS Ph.D. Thesis
Ali Riza Kaylan 1979 156 p
Avail: Univ. Microfilms Order No. 7925574

The use of optimization techniques on the statistical problem of parameter estimation for finite Weibull (including exponential) mixtures from complete and type-1 censored samples is investigated with a primary concern for iterative procedures for maximum likelihood estimation. Algorithmic schemes are devised and implemented successfully to obtain the maximum likelihood estimates with a special emphasis on the essential questions of convergence to the optimal solution and the rate of convergence. The convergence rate of existing iterative schemes for exponential mixtures is improved by employing second order equations in the vicinity of the optimum. The algorithms are extended to censored samples and applied to some data reflecting recidivism activities in criminal justice studies. Dissert. Abstr

N80-13858 Kentucky Univ., Lexington.
DUALITY THEORY, STOCHASTIC REALIZATION AND INVARIANT DIRECTIONS FOR LINEAR DISCRETE-TIME STOCHASTIC SYSTEMS Ph.D. Thesis
Michele Pavon 1979 85 p
Avail: Univ. Microfilms Order No. 7927708

Invariant directions of the Riccati difference equation of Kalman filtering are shown to occur in a large class of prediction problems and to be related to a certain invariant subspace of the transpose of the feedback matrix. The discrete time stochastic realization problem is studied in its deterministic as well as probabilistic aspects. In particular a new derivation of the classification of the minimal Markovian representations of the given process z is presented which is based on a certain backward filter of the innovations. For each Markovian representation which can be determined from z, the space of invariant directions is decomposed into two subspaces, one on which it is possible to predict the state process without error forward in time and one on which this can be done backward in time. A stochastic variational approach to the duality between estimation and control is taken. The duality relation is derived by means of nonformal arguments. It is then compared with the variational principle underlying the Wiener-Hopf integral equation. The Kalman filter is also derived through nonformal duality. Dissert. Abstr.

N80-13859 Florida State Univ., Tallahassee.
NONPARAMETRIC FAMILIES OF LIFE DISTRIBUTIONS. 1: EXTREME POINTS. CHARACTERISTICS Ph.D. Thesis
Ramon Valentin Leon 1979 88 p
Avail: Univ. Microfilms Order No. 7926780

Nonparametric families of life distributions useful in the theory of reliability and biometry were studied. In particular it is shown that the class of discrete decreasing failure rate (DFR) life distributions is a convex class. The extreme points of this class are obtained, and how to represent any discrete DFR distribution as a mixture of these extreme points is shown. The extreme points of the convex class of DFR distributions are identified. Using Choquet's Theorem, it is shown that any DFR distribution can be represented as a mixture of these extreme points. In addition, partial results in identifying the extreme points of the convex set of distributions with decrasing failure rate average are presented. Characterizations are obtained of large classes of non-parametric life distributions, such as the increasing (decreasing) failure rate, increasing (decreasing) failure rate average, new better (worse) than used, etc., classes. The methods used differ from the usual functional equation methods used for the far more common characterizations of parametric families of life distributions. Dissert. Abstr.

N80-13860 Oregon State Univ., Corvallis.
STOCHASTIC INTEGRATION USING RANDOM POINT PROCESSES Ph.D. Thesis
Harvey Bennett Lipman 1979 67 p
Avail: Univ. Microfilms Order No. 7927130

The load modeling problem in electrical distribution networks leads to consideration of a second order stochastic differential equation. To find a solution to such an equation requires consideration of a stochastic integral. The theory chosen makes use of the belated calculus introduced by E. J. McShane. Assuming all integrals are McShane's belated stochastic integrals, it is proved that nth order integrals exist and are unique in the probabilistic sense for the integrator process. Having shown that all integrals of order greater than one vanish using this type of integrator, Ito's formula is introduced which gives a method of calculating a function, F(t, Y(t)), where Y(t) satisfies the stochastic differential equation, dY(t) = f(t, Y(t))dt + g(t, Y(t)d Psi (t). It is proved that the Ito's formula which is appropriate in this case is no more than the standard composite function formula of deterministic calculus. Dissert. Abstr.

N80-13861 Yale Univ., New Haven, Conn.
DETECTION OF MULTIVARIATE OUTLIERS Ph.D. Thesis
Steven Jay Schwager 1979 235 p
Avail: Univ. Microfilms Order No. 7928094

Techniques for detection of outliers in multivariate normal data are developed. Mean slippage and variance slippage are proposed as alternatives to the null hypothesis of no outliers from the given multivariate regression model: Y(nxp) = XB

+ U. The general outlier problem considered for the multivariate mean model: Y = 1 mu + U is shown to be invariant with respect to an extended group of transformations, which includes all affine transformations and permutations of the observations. The multivariate regression model single-outlier problem is shown to be invariant with respect to a natural group of transformations, and three families of matrix valued statistics are obtained and shown to be maximally invariant with respect to this group. For mean slippage alternatives, each observation is associated with a hypothesized distance from the null model if it is an outlier. For any set of n such distances, a class of decision rules is shown to be invariant admissible for the single-outlier problem. Dissert. Abstr.

N80-13862 California Univ., Riverside.
BAYESIAN PARAMETER AND RELIABILITY ESTIMATION FOR A MULTIVARIATE EXPONENTIAL DISTRIBUTION Ph.D. Thesis
Adel Adelmonem Shamseldin 1979 151 p
Avail: Univ. Microfilms Order No. 7926487

The problem of Bayesian parameter and reliability estimation is studied for the bivariate exponential (BVE) distribution in the parallel sampling case and for the most general form of the k-dimensional multivariate exponential (MVE) distribution in series sampling. Joint and marginal posterior distributions are developed along with point and interval estimates. Special attention is given to the case of the BVE with identical marginals. In addition, joint and marginal posterior densities are derived for a (k+1)-parameter version of the k-dimensional MVE distribution in parallel sampling. Closed form Bayes estimators are derived and credibility intervals for individual parameters are constructed. Numerical examples are presented together with graphs of posterior distributions to illustrate the use of the developed methods of estimation. Dissert. Abstr.

N80-13863*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
EXTREME MEAN AND ITS APPLICATIONS
Ram Swaroop and James D. Brownlow Dec. 1979 37 p refs Prepared in cooperation with System Development Corp., Edwards, Calif.
(Contract NAS4-2334)
(NASA-TM-81346) Avail: NTIS HC A03/MF A01 CSCL 12A

Extreme value statistics obtained from normally distributed data are considered. An extreme mean is defined as the mean of p-th probability truncated normal distribution. An unbiased estimate of this extreme mean and its large sample distribution are derived. The distribution of this estimate even for very large samples is found to be nonnormal. Further, as the sample size increases, the variance of the unbiased estimate converges to the Cramer-Rao lower bound. The computer program used to obtain the density and distribution functions of the standardized unbiased estimate, and the confidence intervals of the extreme mean for any data are included for ready application. An example is included to demonstrate the usefulness of extreme mean application. J.M.S.

N80-13864# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
ASYMPTOTIC THEORY FOR PROCESS LEAST SQUARES ESTIMATORS FOR DIFFUSION PROCESSES
B. L. S. Prakasa Rao and Herman Rubin Jul. 1979 29 p refs
(Contract N00014-75-C-0455; NSF MCS-76-08316)
(AD-A073577; MMS-79-13) Avail: NTIS HC A03/MF A01 CSCL 12/1

Strong consistency and asymptotic normality of an estimator related to least squares estimator for parameters involved in nonlinear stochastic differential equations are investigated by studying families of stochastic integrals using Fourier analytic methods. GRA

N80-13865# Stanford Univ., Calif. Dept. of Statistics.
MAXIMUM LIKELIHOOD ESTIMATION OF THE PARAMETERS OF A MULTIVARIATE NORMAL DISTRIBUTION
T. W. Anderson and I. Olkin Jul. 1979 22 p refs
(Contract N00014-75-C-0442; Grant NSF MCS-78-07736; NR Proj. 042-034)
(AD-A073796; SU-TR-38) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper provides an exposition of several alternative techniques used to obtain maximum likelihood estimators for the parameters of a multivariate normal distribution. In particular, matrix differentiaton, matrix transformations and induction are treated. These techniques are used to derive the maximum likelihood estimators of the covariances of a Wishart distribution, of the covariances when there are missing observations, and of the means under a rank constraint. Although the paper is mainly expository, some of the proofs are new. GRA

N80-13866# Texas A&M Univ., College Station. Inst. of Statistics.
A DENSITY-QUANTILE FUNCTION APPROACH TO CHOOSING ORDER STATISTICS FOR THE ESTIMATION OF LOCATION AND SCALE PARAMETERS
Randall Lester Eubank Research Triangle Park, N.C. ARO Jul. 1979 65 p refs
(Grant DAAG29-78-G-0180)
(AD-A073270; TR-A-10; ARO-16228.10-M) Avail: NTIS HC A04/MF A01 CSCL 12/1

It has been shown that the estimation of location and scale parameters by linear systematic statistics may be formulated as a problem in regression analysis of a smoothed sample quantile process. In this dissertation, a general approach to optimal spacings selection is presented that utilizes design techniques for continuous parameter time series regression. This methodology is applied to several common distributions. The problems of optimal order statistic selection for estimation in censored samples, for quantile estimation and for the summarization of large data sets are also considered. GRA

N80-13867# Texas A&M Univ., College Station. Inst. of Statistics.
DISCUSSION OF PAPER BY GOOD AND GASKINS ON DENSITY ESTIMATION AND BUMP HUNTING
Emanuel Parzen Research Triangle Park, N.C. ARO Jul. 1979 14 p ref
(Grant DAAG29-78-G-0180)
(AD-A073269; TR-A-11; ARO-16228.11-M) Avail: NTIS HC A02/MF A01 CSCL 12/1

The view is expressed that the best way to evaluate the approach of Good and Gaskins is to compare it with alternative approaches to density estimation currently available. As a contribution towards this comparative study, this paper describes an analysis of their data using the density-quantile estimation approach proposed by Parzen (1979). GRA

N80-13868# Ohio State Univ., Columbus. Dept. of Statistics.
RECENT APPLICATIONS OF VARIATIONAL TECHNIQUES IN STATISTICS
J. S. Rustagi Aug. 1979 17 p refs
(Contract N00014-78-C-0543)
(AD-A073511; OSU-TR-186) Avail: NTIS HC A02/MF A01 CSCL 12/1

Recent applications of variational methods to problems of statistical inference are given. The problems of robustness, inadmissibility and penalized maximum likelihood estimates are discussed to exhibit their variational character. GRA

N80-13869# Purdue Univ., Lafayette, Ind. Dept. of Statistics.
SOME CONTRIBUTIONS TO GAMMA-MINIMAX AND EMPIRICAL BAYES SELECTION PROCEDURES
Ping Hsiao Aug. 1979 144 p refs
(Contract N00014-75-C-0455)
(AD-A073574; MMS-79-16) Avail: NTIS HC A07/MF A01 CSCL 12/1

The inadequacies of classical tests of homogeneity, in certain situations of interest to the experimenter have long been known. Ranking and selection procedures which are formulated to overcome these shortcomings have provided realistic methods to handle the problems of comparing k populations. In this thesis, some results on gamma-minimax selection procedures and empirical Bayes selection procedure have been obtained. In Chapter 1, a problem of selecting populations close to a control

is considered. Our goal is to select those populations which are sufficiently close to the control. Chapter 2 deals with the problem of selecting the t-best populations. In Chapter 3, a problem of selecting populations better than a control is considered. GRA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N80-13870 Maryland Univ., College Park.
THE CONSTRUCTION OF SPACETIMES FROM INITIAL DATA Ph.D. Thesis
James Allen Isenberg 1979 440 p
Avail: Univ. Microfilms Order No. 7926499

The practical application of the initial value method to the job of constructing general spacetimes is presented. General source fields are discussed and general topologies (e.g., how to evolve patch overlaps) are considered. The step-by-step procedure is quite straightforward, and should prove to be increasingly useful in studying real astrophysical and cosmological phenomena. Dissert. Abstr.

N80-13871 Yale Univ., New Haven, Conn.
ALGORITHMS FOR NETWORK FLOW PROBLEMS WITH CONVEX SEPARABLE COSTS Ph.D. Thesis
John Gregory Klincewicz 1979 250 p
Avail: Univ. Microfilms Order No. 7926258

Two iterative, feasible-direction algorithms for solving convex separable network flow problems are developed. The first is a 'scaled reduced gradient' (SRG) technique with general applicability. Its performance on a group of water distribution problems is compared to that of a reduced gradient and a convex simplex code. The second algorithm is an approach for implementing an exact Newton method for network flow problems. It uses preconditioned conjugate direction methods to calculate second-order estimates of the dual multipliers and depends heavily on the network structure of the constraint matrix. Computational results with this procedure indicate a trade-off between the time spent calculating dual variable estimates at each iteration and the total number of iterations required. Dissert. Abstr.

N80-13872 Wisconsin Univ. - Madison.
NEWTON'S METHOD FOR GENERALIZED EQUATIONS AND THE PIES ENERGY MODEL Ph.D. Thesis
Norman Harold Josephy 1979 108 p
Avail: Univ. Microfilms Order No. 7922122

A number of results concerning the convergence and convergence rates of Newton and quasi-Newton methods for generalized equations are proven. Examples are given to emphasize the application of these methods to generalized equations representing the nonlinear programming problem and the nonlinear complementarity problem. Computational results of Newton's method are presented as applied to the economic equilibrium problem of the Project Independence Evaluation System (PIES) Energy Model. Solutions to a simplified version of PIES are obtained using a Newton method, and comparisons are made to solutions which appeared in the literature. Dissert. Abstr.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N80-13873 Johns Hopkins Univ., Baltimore, Md.
ON CONGRUENCE SUBGROUP PROBLEM AND RELATED TOPICS Ph.D. Thesis
Jasbir Singh Chahal 1979 50 p
Avail: Univ. Microfilms Order No. 7924606

The congruence subgroup problem is studied for some algebraic groups which are not simply connected. The problem was solved in the affirmative for any solvable algebraic group defined over an arbitrary number field (whether totally imaginary or not). A special treatment was given to the algebraic torus defined by the Pell's equations and a stronger result was obtained, viz. that any subgroup of finite index in the group of units contains a congruence subgroup of index 1, 2, 4 or 8 in it. Some properties of those discontinuous subgroups of the orthogonal group in 2n(n > or equal to 3) variables which contain a congruence subgroup are discussed. Dissert. Abstr.

N80-13874 Temple Univ., Philadelphia, Pa.
INVARIANT SUBSPACES ASSOCIATED WITH DECOMPOSITION Ph.D. Thesis
Gary William Shulberg 1979 89 p
Avail: Univ. Microfilms Order No. 7924027

The spectral decomposition problem is discussed by investigating several classes of invariant subspaces arising from the theory of decomposable operators. Some n characterizations and spectral relationships for spectral maximal, absorbant, analytically invariant, paraclosed, and upsilon and mu spaces are given. A variation on the idea of asymptotic decomposability which yields results not unlike those for operators having decomposable spectra is presented. Decomposable extensions and restrictions of operators are discussed. Dissert. Abstr.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N80-13875# Los Alamos Scientific Lab., N. Mex.
CONTRIBUTIONS OF SHOCK-WAVE PHYSICS TO HIGH-PRESSURE STANDARDS
J. N. Fritz 1979 8 p refs Presented at the 7th Intern. AIRAPT High Pressure Technol. Conf., La Creusot, France, 30 Jul.-3 Aug. 1979
(Contract W-7405-eng-36)
(LA-UR-79-2039; CONF-790709-10) Avail: NTIS HC A02/MF A01

The obtaining of a primary pressure standard by dynamic means is discussed. The evolution and current state of the copper Hugoniot curve and its reduction to an isotherm is given. Similar, but less complete considerations are given for tantalum. DOE

N80-13876# Sandia Labs., Albuquerque, N. Mex.
CONTROLLING MAGNETIC FIELD PROFILES
J. R. Freeman Apr. 1979 23 p refs
(Contract EY-76-C-04-0789)
(SAND-79-0678) Avail: NTIS HC A02/MF A01

A method for designing solenoid magnets with controlled field profiles is discussed. The method minimizes both the field errors and the power consumption. An NOS time sharing computer program for the CDC 6600, entitled MAGCOR, constructed to provide an interactive magnet design capability is discussed. Results obtained during the design of magnets for a radial line electron accelerator are presented. DOE

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N80-13877 Northwestern Univ., Evanston, Ill.
AUDITORY DETECTION OF BANDPASS-FILTERED IMPULSES UNDER VARIOUS CONDITIONS OF MASKING Ph.D. Thesis
Jorge Rocafort 1979 130 p
Avail: Univ. Microfilms Order No. 7927434

An experiment designed to investigate a process analogous to prewhitening in human auditory detection is described. A class of signals, bandpass filtered impulses, the spectral structure of which allowed a simplified analysis of the hypothesized effect, was employed. Signal detectability was studied under three different conditions of noise masking: wide band, close matched,

and matched configurations. An energy detection scheme incorporating prewhitening was utilized as a working model for experimental design and data analysis. Threshold shift dependence upon signal spectral structure and frequency was examined.
Dissert. Abstr.

N80-13878*# Massachusetts Inst. of Tech., Cambridge.
RELATION OF ULTRASONIC ENERGY LOSS FACTORS AND CONSTITUENT PROPERTIES IN UNIDIRECTIONAL COMPOSITES Final Report
James H. Williams, Jr., Samson S. Lee, and Hamid NayebHashemi Washington NASA Dec. 1979 29 p refs
(Grant NsG-3210)
(NASA-CR-3181) Avail: NTIS HC A03/MF A01 CSCL 20A

A model is developed relating composite constituents properties with ultrasonic energy loss factors for longitudinal waves propagating in the principal directions of a unidirectional graphite/epoxy fiber composite. All the constituents are assumed to behave as linear viscoelastic materials with energy dissipation properties defined by loss factors. It is found that by introducing a new constituent called the interface material, the composite and constituent properties can be brought into consistency with simple series and parallel models. An expression relating the composite loss factors to the loss factors of the constituents is derived and its coefficients are evaluated. Author

N80-13879*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENTAL STUDY OF ACOUSTIC LOADS ON AN UPPER-SURFACE-BLOWN STOL AIRPLANE CONFIGURATION
Conrad M. Willis and James A. Schoenster Dec. 1979 57 p
(NASA-TP-1577; L-13167) Avail: NTIS HC A04/MF A01 CSCL 20A

Fluctuating pressure levels were measured on the flap and fuselage of an upper-surface-blown jet-flap airplane configuration in a wind tunnel. The model tested had turbofan engines with a bypass ratio of 3 and a thrust rating of 10 kN. Rectangular nozzles were mounted flush with the upper surface at 35 percent of the wing chord. Test parameters were flap deflection angle, jet impingement angle, angle of attack, free-stream velocity, spanwise location of the engine, and jet dynamic pressure. Load levels were high throughout the jet impingement region, with the highest levels (about 159 dB) occurring on the fuselage and near the knee of the flap. The magnitude of the forward-velocity effect appeared to depend upon the ratio of free-stream and jet velocities. Good agreement was obtained between fluctuating pressure spectra measured at jet dynamic pressures of 7 and 22 kPa when the spectra were scaled by nondimensional functions of dynamic pressure, velocity, and the empirical relationship between dynamic pressure and overall fluctuating pressure level. Author

N80-13880*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF SOUND LEVEL FLUCTUATIONS ON ANNOYANCE CAUSED BY AIRCRAFT-FLYOVER NOISE
David A. McCurdy Dec. 1979 40 p refs
(NASA-TP-1576; L-13181) Avail: NTIS HC A03/MF A01 CSCL 20A

A laboratory experiment was conducted to determine the effects of variations in the rate and magnitude of sound level fluctuations on the annoyance caused by aircraft-flyover noise. The effects of tonal content, noise duration, and sound pressure level on annoyance were also studied. An aircraft-noise synthesis system was used to synthesize 32 aircraft-flyover noise stimuli representing the factorial combinations of 2 tone conditions, 2 noise durations, 2 sound pressure levels, 2 level fluctuation rates, and 2 level fluctuation magnitudes. Thirty-two test subjects made annoyance judgements on a total of 64 stimuli in a subjective listening test facility simulating an outdoor acoustic environment. Variations in the rate and magnitude of level fluctuations were found to have little, if any, effect on annoyance. Tonal content, noise duration, sound pressure level, and the interaction of tonal content with sound pressure level were found to affect the judged annoyance significantly. The addition of tone corrections and/or duration corrections significantly improved the annoyance prediction ability of noise rating scales. Author

N80-13881*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ASSESSMENT AT FULL SCALE OF EXHAUST NOZZLE TO WING SIZE ON STOL-OTW ACOUSTIC CHARACTERISTICS
U. VonGlahn and D. Grosbeck 1979 27 p refs Presented at 98th Meeting of the Acoustical Soc. of Am., Salt Lake City, 26-30 Nov. 1979
(NASA-TM-79279; E-215) Avail: NTIS HC A03/MF A01 CSCL 20A

On the basis of static aero/acoustic data obtained at model scale, the effect of exhaust nozzle size on flyover noise is evaluated at full scale for different STOL-OTW nozzle configurations. Three types of nozzles are evaluated: a circular/deflector nozzle mounted above the wing; a slot/deflector nozzle mounted on the wing; and a slot nozzle mounted on the wing. The nozzle exhaust plane location, measured from the wing leading edge, was varied from 10 to 46 percent of the wing chord (flaps retracted). Flap angles of 20 deg (takeoff) and 60 deg (approach) are included in the study. Initially, perceived noise levels (PNL) are calculated as a function flyover distance at 152m altitude. From these plots, static EPNL values (defined as flyover relative noise levels), are obtained as functions of nozzle size for equal aerodynamic performance (lift and thrust). The acoustic benefits attributable to nozzle size relative to a given wing chord size are assessed.
A.R.H.

N80-13882*# Hamilton Standard, Windsor Locks, Conn.
ADVANCED TURBO-PROP AIRPLANE INTERIOR NOISE REDUCTION-SOURCE DEFINITION Final Report
B. Magliozzi and Bennett M. Brooks Oct. 1979 90 p refs
(Contract NAS3-20614)
(NASA-CR-159668) Avail: NTIS HC A05/MF A01 CSCL 20A

Acoustic pressure amplitudes and phases were measured in model scale on the surface of a rigid semicylinder mounted in an acoustically treated wind tunnel near a prop-fan (an advanced turboprop with many swept blades) model. Operating conditions during the test simulated those of a prop-fan at 0.8 Mach number cruise. Acoustic pressure amplitude and phase contours were defined on the semicylinder surface. Measurements obtained without the semi-cylinder in place were used to establish the magnitude of pressure doubling for an aircraft fuselage located near a prop-fan. Pressure doubling effects were found to be 6dB at 90 deg incidence decreasing to no effect at grazing incidence. Comparisons of measurements with predictions made using a recently developed prop-fan noise prediction theory which includes linear and non-linear source terms showed good agreement in phase and in peak noise amplitude. Predictions of noise amplitude and phase contours, including pressure doubling effects derived from test, are included for a full scale prop-fan installation. Author

N80-13883# Battelle Pacific Northwest Labs., Richland, Wash.
PATTERN RECOGNITION METHODS FOR ACOUSTIC EMISSION ANALYSIS
P. G. Doctor, T. P. Harrington, and P. H. Hutton Jul. 1979 58 p refs
(Contract EY-76-C-06-1830)
(NUREG-CR-0910) Avail: NTIS HC A04/MF A01

The application of pattern recognition techniques to acoustic emissions is examined. Three methods of performing the pattern recognition analysis are discussed. They are interfeature correlations, cluster analysis, and multidimensional display techniques. The data acquisition system is described and the types of acoustic emissions are identified. A.W.H.

N80-13884# Argonne National Lab., Ill.
SCATTERING OF ULTRASONIC WAVES BY PERIODICALLY ROUGHENED SURFACES
K. J. Reimann and W. A. Ellingson 1979 6 p refs Presented at the 25th ISA Intern. Instrumentation Symp., Anaheim, Calif., 7 May 1979
(Contract W-31-109-eng-38)
(CONF-790505-17) Avail: NTIS HC A02/MF A01

Detection of surface erosion by ultrasonic methods of the interior surfaces of transport components used to contain two phase flow in coal conversion systems was investigated. The

effect of surface roughness on wall thickness measurements was examined during laboratory studies of acoustic scattering on periodically roughened samples with peak-to-peak distances of 1 to 5 mm and depths of 0.3 to 4.7 mm. Characterization of periodicity, angle, and depth of the roughened surfaces was performed by ultrasonic pulse echo techniques with signal analysis, utilizing computer averaging, fast Fourier transforms, and consideration of spectral energies. Data indicate that spectral analysis and signal enhancement yield reliable information on the depth and spatial frequency of the roughened surfaces. DOE

N80-13885# Admiralty Marine Technology Establishment, Teddington (England).
ESTIMATION OF THE RMS VALUE OF SUMMED SINUSOIDS AND THE APPLICATION TO ACOUSTIC NOISE MEASUREMENT IN SHALLOW WATER
A. W. Walker London HMSO Nov. 1978 41 p refs (AMTE(N)-TM-78413; BR66838) Avail: NTIS HC A03/MF A01

The spatial variation of many measurable quantities, such as pressure or velocity, may generally be synthesized by the sum of a given number of sinusoids. The power average of a small number of random of samples is presented as a suitable estimate of the mean power contained in such a sum of sinusoids of random argument and equal amplitude. The confidence levels which apply to these estimates are presented and the technique is illustrated by its application to the measurement of acoustic radiated noise in shallow water by the appropriate use of vertical transducer arrays. Author (ESA)

N80-13886# Royal Aircraft Establishment, Farnborough (England).
THE SCATTERING OF SOUND BY A REGION OF FLUID IN SOLID BODY ROTATION AT LOW MACH NUMBER
K. Taylor London HMSO Aug. 1978 40 p refs (RAE-TR-78100; RAE-Aero-3440; BR66370) Avail: NTIS HC A03/MF A01

This example, which is one of the simplest to exhibit vortex refraction of sound, is solved using an approximation which is uniformly valid at all frequencies and small Mach numbers. The region of solid body rotation is bounded by a vortex sheet which implies that the results obtained have little physical relevance. However, this flow field gives acoustic equations which are comparatively easy to solve and thus an ideal test case for the various approximate techniques used to investigate the effect of more realistic vortices on sound. An assessment of a method which sets out to express the acoustic pressure as an asymptotic power series in the Mach number is given. It is found that this approach produces an error which increases progressively as the frequency increases at a fixed Mach number. At higher frequencies it appears that the ray theory approximation is likely to be more accurate. Author (ESA)

N80-13887# National Gas Turbine Establishment, Pyestock (England).
A REVIEW OF THE RESEARCH AT NGTE CONCERNING THE EFFECTS OF FLIGHT ON ENGINE EXHAUST NOISE
W. D. Bryce London Sep. 1978 76 p refs (NGTE-R-78007; BR65126) Avail: NTIS HC A05/MF A01

The problem of explaining the changes in engine exhaust noise when going from static to flight conditions has puzzled research workers for some years. Various experimental research programs which were carried out in regards to this topic over the last five years are reviewed. The step-by-step progress which was made in the analysis of the problem is described and the results from some recent tests are presented. Flight tests indicate that the engine noise reduces in the rear arc, but at 90 deg to the engine axis and in the forward arc the engine noise is increased. Wind tunnel results and static tests are used to characterize jet noise and internally generated engine noise. Analysis indicates, based on a model of the mechanisms dominating engine exhaust noise, that acoustic and aerodynamic effects arising from installation configurations of engines in aircraft consitute the main features responsible for this noise increase in flight. Author (ESA)

N80-13300 Naval Underwater Systems Center, New London, Conn.
A SURVEY OF FINITE ELEMENT-RELATED TECHNIQUES AS APPLIED TO ACOUSTIC PROPAGATION IN THE OCEAN. PART 1: FINITE ELEMENT METHOD AND RELATED TECHNIQUES
A. J. Kalinowski *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 3 Mar. 1979 p 9-16 refs (For primary document see N80-13298 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington D. C. 20375 CSCL 20/1

N80-13304 Naval Underwater Systems Center, New London, Conn.
A SURVEY OF FINITE ELEMENT-RELATED TECHNIQUES AS APPLIED TO ACOUSTIC PROPAGATION IN THE OCEAN. PART 2: TRANSPARENT BOUNDARY SIMULATION TECHNIQUES
A. J. Kalinowski *In* SVIC The Shock and Vibration Digest, Vol. 11, No. 4 Apr. 1979 p 7-16 refs (For primary document see N80-13302 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/1

N80-13311 Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
RECENT DEVELOPMENTS FOR THE NONLINEAR DISTORTION OF NON-DISPERSIVE ACOUSTIC WAVES. PART 1: PLANAR WAVES AND THE BASIC METHOD
J. H. Ginsberg *In* SVIC Shock and Vibration Digest, Vol. 11, No. 7 Jul. 1979 p 3-8 refs (For primary document see N80-13310 04-31)
Avail: SVIC, Code 8404, Naval Research Lab., Washington, D. C. 20375 CSCL 20/1

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N80-13888 Oregon Univ., Eugene.
PRECISION DETERMINATION OF ATOMIC LEVEL ENERGIES BY ABSORPTION SPECTROMETRY WITH SYNCHROTRON RADIATION Ph.D. Thesis
Marianne Breinig 1979 114 p
Avail: Univ. Microfilms Order No. 7927230

Accurate measurements of the absolute energies of the ArK, KrK, and XeL sub 1, 2, 3 levels were carried out by X-ray absorption spectroscopy. The measurements serve to test recent theoretical atomic electron binding energies in which the remaining uncertainties for inner shells reside primarily in the Breit interaction, vacuum polarization, self energy, and the effect of correlation. Each spectrum was theoretically modelled with at least 4 Lorentzians representing the lowest energy one electron dipole transitions to bound excited states and one arc tangent representing dipole transitions to higher bound states and to the continuum. Energy differences from optical spectral series were used to relate the excited state energies to the vacuum level. Dissert. Abstr.

N80-13889 Oregon Univ., Eugene.
MEASUREMENT OF THE INELASTIC X-RAY SCATTERING CROSS SECTION OF NEON WITH SYNCHROTRON RADIATION Ph.D. Thesis
Fernando Antonio de Freitas Costa Parente 1979 185 p
Avail: Univ. Microfilms Order No. 7927271

Inelastic differential X-ray scattering cross sections, which are sensitive to electron-electron Coulomb correlation, are discussed through an approach made possible by the high flux and tunability of synchrotron radiation. The incident X-ray energy was chosen so that detection of elastically scattered photons was suppressed by critical absorption with a suitable filter. The ratio of inelastically to elastically scattered photons reaching the detector was boosted by approximately two orders of magnitude. The coherent/incoherent cross section ratio was then determined with measurement of the filter absorption edge. The scattering by Ne at incident X-ray energies just above the K edges of Ti,

V, Co, Fe, Ni, Cu, and Zn was measured. Results were compared with theoretical predictions based on the impulse approximation, and on the Waller-Hartree theory with wave functions that include 86 percent of correlation. New theoretical calculations were performed, based on the excited state approximation.
Dissert. Abstr.

N80-13890 Wisconsin Univ. - Madison.
DESIGN AND ANALYSIS OF TRANSIENT HIGH VOLTAGE ELECTRICAL DEVICES: OZONE PRODUCTION IN FAST PULSED DIELECTRIC BARRIER DISCHARGES IN OXYGEN AND MODELING OF AN INTENSE RELATIVISTIC ELECTRON BEAM SOURCE Ph.D. Thesis
Louis Andrew Rosocha 1979 215 p
Avail: Univ. Microfilms Order No. 7922142

Electrical discharges in O2 gas initiated by fast transient high voltage pulses from a flat plate Blumlein circuit are examined. Oxygen gas was excited between the electrodes of a dielectric barrier discharge cell connected to the Blumlein pulse forming network. The electrical breakdown of the gas and subsequent plasma kinetic reactions, which resulted in the formation of appreciable number densities of O3 molecules, is discussed along with the ozone densities. Ozone concentrations were measured by the absorption of UV light of wavelength 2537 A. The time dependence of the absorption signal was measured to determine the time constants for the formation of O3 molecules at various pressures of O2 gas. The design and operation of an intense relativistic electron beam device capable of output voltages of approximately 1 MV and currents of approximately 100 kA is discussed. A theoretical model based on a time dependent Langmuir-Childs description was formulated to model the output field emission diodes of a Marx generator pulsed coaxial Blumlein device. Dissert. Abstr.

N80-13891 Baylor Univ., Waco, Tex.
MOLECULAR APPLICATION TO THE EQUATIONS OF MOTIONS METHOD Ph.D. Thesis
Linda Pauline Kinslow 1979 205 p
Avail: Univ. Microfilms Order No. 7926669

Various approximations of the equations of motion method (EOM) were employed to study the excited states of C2H4, BF, and C3H4. In the EOM method the excitation energies are calculated directly, as opposed to the configuration interaction method. Gaussian basis sets were used to calculate the excitation energies of the excited states of ethylene and allene. The EOM values of the excitation energies for different excited states are discussed. Dissert. Abstr.

N80-13892 Minnesota Univ., Minneapolis.
NEW METHODS FOR QUANTUM MECHANICAL CALCULATIONS OF INELASTIC ATOM-MOLECULE COLLISIONS AND ELECTRON SCATTERING Ph.D. Thesis
Nancy Mullaney Harvey 1979 378 p
Avail: Univ. Microfilms Order No. 7926131

The close coupling method and the derivation of the close coupling equations for several systems are discussed. The theoretical foundation for, and the application of a suitably modified version of the R matrix propagation method of Light and Walker, which are used to numerically solve the close coupling equations for inelastic scattering processes are described. The efficiency of the R matrix propagation method for vibrationally inelastic collinear atom molecule scattering, for rotationally inelastic atom molecule and electron molecule scattering, and for electronically inelastic electron atom scattering are illustrated. The advantages of expanding the system wavefunction in adiabatic basis functions are emphasized. Dissert. Abstr.

N80-13893 Virginia Univ., Charlottesville.
LASER-INDUCED EMISSION FROM URANIUM-HEXAFLUORIDE Ph.D. Thesis
Stephen William Allison 1979 162 p
Avail: Univ. Microfilms Order No. 7927990

The emission which results when a pulsed N2 laser or dye laser is focused in gaseous UF6 is investigated. The emission is associated with electrical breakdown in the gas in the vicinity of the focal point. The intensity and spectrum of this emission is measured from 262 to 650 nm as a function of gas pressure, laser power, laser wavelength, and other parameters of the measurements. The lifetime (e-folding time) of the emission intensity decay is measured. Photon absorption and Rayleigh scattering by the breakdown plasma are examined as a function of laser power and gas pressure. The yield of positive ions produced by the N2 laser is measured, as a function of pressure (0.1 to 40 torr), laser power (20 to 195 kW), and ion collector potential (-300 to -900 V). Laser induced fluorescence from UF6 isolated in low temperature matrices, primarily Ar, is investigated. The apparatus and procedures used to obtain the data are described. Applications of the breakdown process as a flow diagnostic for UF6 are considered. Dissert. Abstr.

N80-13894# California Univ., Livermore. Lawrence Livermore Lab.
K-L AND L-K VACANCY SHARING IN ION-ATOM COLLISIONS
R. J. Fortner Nov. 1978 5 p refs Presented at the 5th Conf. on the Appl. of Small Accelerators, Denton, Tex., 6-8 Nov. 1978
(Contract W-7405-eng-48)
(UCRL-81947; CONF-781113-25) Avail: NTIS HC A02/MF A01

The sharing of K and L vacancies in highly symmetric collisions in low energy ion-atom collisions using the molecular model is summarized. The theoretical models available for vacancy sharing are reviewed. DOE

N80-13895# California Univ., Livermore. Lawrence Livermore Lab.
STUDIES IN MOLECULAR DYNAMICS OF THE FRICTION COEFFICIENT AND THE LORENTZ GAS Ph.D. Thesis
W. E. Alley 1 Jul. 1979 185 p refs
(Contract W-7405-eng-48)
(UCRL-52815) HC A09/MF A01

Three hard sphere molecular dynamics studies are presented. The first describes a modification of Fick's diffusion law, required whenever long time correlations are present. The second study concerns the mass and size dependence of the friction coefficient as well as its dependence on boundary conditions. The study presents a molecular dynamics method which calculates the infinite mass friction coefficient of finite size hard sphere particles. The third study presents the applicability of hydrodynamics to describe fluctuations in fluids on the molecular level. This study shows that the fluctuations present in a system of hard spheres when placed between closely spaced parallel hard walls lead to an acoustical resonance for those wavelengths which correspond to the spacing, or integer fractions thereof. DOE

N80-13896# Los Alamos Scientific Lab., N. Mex.
MULTIPLE-PHOTON EXCITATION OF POLYATOMIC MOLECULES IN A STRONG OPTICAL FIELD: A UNIVERSAL NORMALIZATION
C. P. Robinson and O. P. Judd 1979 93 p refs Presented at 4th Intern. Conf. on Laser Spectroscopy, Rottach-Egern, Tegernsee, West Germany, 11 Jun. 1979
(Contract W-7405-eng-36)
(LA-UR-79-1524; CONF-790690-1) Avail: NTIS HC A05/MF A01

The phenomenon of Multiple Photon Excitation (MPE) of polyatomic molecules by a (laser) optical field is examined. A picture of the interaction which emphasizes the dynamics of absorption within a single vibrational manifold with rapid intramodal coupling to other vibrational modes is discussed. The similarity between this picture of the excitation process by an optical field and the de-excitation process for vibrational relaxation of polyatomics is examined. A universal curve for the MPE process by analogy to the Lambert-Salter correlation for relaxation processes is studied. DOE

N80-13897# California Univ., Berkeley. Lawrence Berkeley Lab.
PERFORMANCE OF A PRESSURIZED MULTIWIRE PROPORTIONAL CHAMBER FOR NEUTRON RADIOGRAPHY M.S. Thesis
Bruce Director Jun. 1979 43 p refs
(Contract W-7405-eng-48)
(LBL-9316) Avail: NTIS HC A03/MF A01

The effect of gas density on resolution and efficiency of a

neutron sensitive multiwire proportional chamber is examined. Increasing the density will shorten the reaction products range. A pressure vessel, designed and constructed for 4 atm thereby reducing the range of the reaction products from the neutron converter by a factor of 4, compared to 1 atm is discussed. Two different materials, gadolinium and boron, were tested to improve the efficiency of the neutron converters. DOE

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N80-13898 Texas Univ. Health Science Center, Houston.
ENERGY AND SPECTRUM MEASUREMENTS OF HIGH ENERGY ELECTRONS BEAMS USING A CERENKOV DETECTOR Ph.D. Thesis
Carlos Eduardo Velosa DeAlmeida 1979 153 p
Avail: Univ. Microfilms Order No. 7925033

A gas Cerenkov detector was used to obtain the energy of therapy electrons from 4 - 40 MeV. It consists of a 60 cm long pipe with aluminum windows, a mylar mirror at 45 degrees, placed at the far end reflecting the Cerenkov light through a Lucite window onto the PM tube. Light output versus pressure were obtained and the pressure being the critical variable of the method was monitored by a pressure transducer of .05% accuracy calibrated at NASA Standard Laboratory. Results of beam energy measurements from different radiotherapy machines are presented. The energy distribution obtained from the light output for these various beams, showing the effect of the scattering foils in the energy distribution are reported. Dissert. Abstr.

N80-13899 Oregon Univ., Eugene.
CHARGE CARRIER MOBILITY AND TRANSMISSION ACROSS THE LIQUID-VAPOR INTERFACE FOR THE DIELECTRIC LIQUID HYDROGEN Ph.D. Thesis
Gary Edward Grimm 1979 143 p
Avail: Univ. Microfilms Order No. 7927244

A radioactive source is used to inject positive and negative charge carriers into the dielectric fluid, liquid hydrogen. The mobility of positive and negative charge carriers is measured. The negative charge carrier mobility is found to be greater than that of the positive charge carrier. Both mobilities are found to be temperature dependent. The radius of the charge carriers is determined from the Navier-Stokes equation and hydrodynamic arguments. This radius is compared with theoretical predictions, where the radius is determined by minimization of the total energy of the charge carrier. Experimental data for the transmission of charge carriers across the liquid-vapor interface of liquid hydrogen is presented. The trapping time at the interface is determined by direct measurements of the decay rate of charge trapped at the liquid surface. Dissert. Abstr.

N80-13900 Cornell Univ., Ithaca, N. Y.
GENERATION AND CONTROL OF A SLOW SPACE CHARGE WAVE ON A HIGH CURRENT ELECTRON BEAM AND ITS POTENTIAL AS A COLLECTIVE ION ACCELERATOR Ph.D. Thesis
George Michael Gammel 1979 144 p
Avail: Univ. Microfilms Order No. 7926897

The slow space charge wave was successfully grown, and techniques were developed to measure its phase velocity and electric field amplitude. The amplitude was large enough to be of interest for ion acceleration, but a beam instability prevented the attainment of a low phase velocity, controllable during a single shot. The experimental results indicated that the desired phase velocity properties could be achieved if the instability were eliminated, for example by increasing the strength of the guiding magnetic field. Dissert. Abstr.

N80-13901# Sandia Labs., Albuquerque, N. Mex.
RELATIVISTIC ELECTRON BEAM ENERGY DEPOSITION IN THIN GOLD AND ALUMINUM TARGETS
E. J. T. Burns, S. A. Goldstein, J. A. Halbleib, L. P. Mix, J. N. Olsen, J. W. Poukey, J. P. Quintenz, and M. M. Widner Jan. 1979 53 p refs
(Contract EY-76-C-04-0789)
(SAND-78-2026) Avail: NTIS HC A04/MF A01

Relativistic electron beam energy deposition in thin gold and aluminum targets was investigated using radiation temperature measurements in the soft X-ray, vacuum ultraviolet and optical spectral regions on two different particle accelerators. Energy deposition measurements were compared with numerical calculations utilizing particle in cell diode codes, condensed history Monte Carlo codes, and coupled radiation hydrodynamic codes. The specific power deposited and the self magnetic field are discussed. DOE

N80-13902# Atomic Energy of Canada Ltd., Pinawa (Manitoba).
CONCEPTUAL DESIGN STUDY OF A CONCRETE CANISTER SPENT-FUEL STORAGE FACILITY
E. D. Lidfors, T. Tabe, and H. M. Johnson Jan. 1979 80 p refs
(AECL-6301) Avail: NTIS (US Sales Only) HC A05/MF A01; DOE Depository Libraries

Interim storage of CANDU (CANada Deuterium Uranium) spent fuel in concrete canisters is studied. The canisters are concrete flasks which contain fuel prepackaged in double steel containment, and are cooled by natural air convection. The facilities required and the operations involved, are described. A summary of costs, a survey of the monitoring requirements and a prediction of the personnel exposures associated with this method of storing spent fuel are reported. DOE

N80-13903# Stanford Linear Accelerator Center, Calif.
ELASTIC ELECTRON SCATTERING AT LARGE MOMENTUM TRANSFER
R. G. Arnold May 1979 6 p refs Presented at the Intern. Conf. on Nucl. Phys. with Electromagnetic Interactions, Mainz, West Germany, 5 Jun. 1979
(Contract DE-AC03-76SF-00515)
(SLAC-PUB-2334; CONF-790610-2) Avail: NTIS HC A02/MF A01

A review is given of elastic electron scattering at large momentum transfer (sq Q > 20/sq fm) from nuclei with A less than or equal to 4 are given. Recent experimental results are reviewed and the current problems in interpretation of these results are pointed out. Some questions for future experiments are posed, and a preview of possible future measurements is presented. DOE

N80-13904# Stanford Linear Accelerator Center, Calif.
PHENOMENOLOGY OF HEAVY LEPTONS AND HEAVY QUARKS
F. J. Gilman Nov. 1978 14 p refs Presented at the Kyoto Summer Inst. for Particle Phys., Kyoto, 1-5 Sep. 1978
(Contract EY-76-C-03-0575)
(SLAC-PUB-2226) Avail: NTIS HC A02/MF A01

The quark and lepton family are reviewed. Properties of the tau, SU(2) x U(1) classification of the tau and its decays, heavier leptons, the spectroscopy of heavy hadrons composed of quarks, their strong and electromagnetic decays, the weak interaction properties of the c, b, and t quarks, and the decays of hadrons containing them expected within the context of the standard SU(2) x U(1) mode are included. DOE

N80-13905# Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Reactor Engineering Div.
SPENT FUEL RECEIPT AND LAG STORAGE FACILITY FOR THE SPENT FUEL HANDLING AND PACKAGING PROGRAM
J. E. Black and F. D. King Jan. 1979 281 p refs
(Contract EY-76-C-09-0001)
(DPSTD-SFHP-78-10) Avail: NTIS HC A13/MF A01

The operation and design of a spent light water reactor fuel storage plant is examined. The design bases including safety, operation, and the underwater handling and storage capabilities are discussed. A physical description of the plant with equipment requirements, support systems design, and safety criteria and

assurance is presented. The shipping and transportation of the light water to the plant is investigated. A.W.H.

N80-13906# Los Alamos Scientific Lab., N. Mex.
BASELINE DESIGN OF THE THERMOELECTRIC REACTOR SPACE POWER SYSTEM
W. A. Ranken and D. R. Koenig 1979 8 p refs Presented at 14th Intersoc. Energy Conversion Conf., Boston, 5 Aug. 1979
(Contract W-7405-eng-36)
(LA-UR-79-1242; CONF-790803-21) Avail: NTIS HC A02/MF A01

An extensive review of design alternatives for a nuclear reactor space power system capable of delivering 10 to 100 kW/sub e/ has led to the selection of a heat-pipe-cooled fast spectrum reactor with a thermoelectric power conversion system. The reactor design features a laminated core configuration with sheets of molybdenum - extending across the full diameter of the core - interspersed between layers of UO2. Reactor heat is transferred by these sheets from the UO2 to an array of 90 Mo/Na heat pipes that are spaced so that each receives equal power from an essentially uniform fuel loading in the core. This heat is transported by these heat pipes around the LiH shield to a ring of high-power-density thermoelectric modules constructed from modified SiGe alloys. Conversion takes place over a temperature interval of 1375 to 775 K with an efficiency of 9 percent. Residual heat is rejected by a conical radiator that is constructed from cross-coupled beryllium heat pipes. DOE

N80-13907# California Univ., Berkeley. Lawrence Berkeley Lab.
VECTOR CURRENT SCATTERING IN TWO DIMENSIONAL QUANTUM CHROMODYNAMICS Ph.D. Thesis
N. L. Fleishon Apr. 1979 135 p refs
(Contract W-7405-eng-48)
(LBL-9022) Avail: NTIS HC A07/MF A01

The interaction of vector currents with hadrons is considered in a two dimensional SU(N) color gauge theory coupled to fermions in leading order in an N-1 expansion. After giving a detailed review of the model, various transition matrix elements of one and two vector currents between hadronic states are considered. A pattern is established whereby the low mass currents interact via meson dominance and the highly virtual currents interact via bare quark-current couplings. This pattern is especially evident in the hadronic contribution to inelastic Compton scattering, which is investigated in various kinematic limits. It is shown that in the dual Regge region of soft processes the currents interact as purely hadronic systems. Modification of dimensional counting rules is indicated by a study of a large angle scattering analog. In several hard inclusive nonlight cone processes, parton model ideas are confirmed. The impulse approximation is valid in a Bjorken-Paschos-like limit with very virtual currents. A Drell-Yan type annihilation mechanism is found in photoproduction of massive lepton pairs, leading to identification of a parton wave function for the current. DOE

N80-13908# California Univ., Livermore. Lawrence Livermore Lab.
REMOTE SYSTEMS REQUIREMENTS OF THE HIGH YIELD LITHIUM INJECTION FUSION ENERGY (HYLIFE) CONVERTER CONCEPT
P. E. Walker Oct. 1978 28 p refs Presented at the ANS Meeting, Washington, D.C., 12 Nov. 1978 Submitted for publication
(Contract W-7405-eng-48)
(UCRL-81309) Avail: NTIS HC A03/MF A01

Remote systems required in the high yield lithium injection fusion energy converter power plant for inspection operations, viewing of the chamber interior and certain pumps, valve fittings, and welds are discussed. Ideas for remote maintenance of laser beam blast baffles, optics, and target material traps are described. Radioisotope sources and their distributions, and exposure rates at various points in the reactor vicinity are presented. DOE

N80-13909# Sandia Labs., Albuquerque, N. Mex.
EVALUATION OF THE PROPOSED WIPP SITE IN SOUTHEAST NEW MEXICO
W. D. Weart 1979 35 p refs Presented at 87th AICHE Natl. Meeting, Boston, 19 Aug. 1979
(Contract EY-76-C-04-0789)
(SAND-79-1113C; CONF-790822-7) Avail: NTIS HC A03/MF A01

Five years of Earth science characterization of the proposed Waste Isolation Pilot Plant site provide a high level of assurance that the area is satisfactory for development of a geologic repository. Ecological investigations and socioeconomic studies have indicated only relatively benign impacts will occur from construction, operation and long-term aspects of the repository. DOE

N80-13910# Idaho National Engineering Lab., Idaho Falls.
X-RAY AND GAMMA RAY TRANSMISSION DENSITOMETRY
G. D. Lassahn, A. G. Stephens, D. J. Taylor, and D. B. Wood 1979 149 p refs Presented at the Intern. Colloq. on Densitometry, Idaho Falls, Idaho, 10 Jun. 1979
(Contract EY-76-C-07-1570)
(CONF-790692-1) Avail: NTIS HC A07/MF A01

Gamma and X-ray attenuation densitometers, systems in which measurements of the attenuation of one or several radiation beams are used to infer the density of the attenuating material are examined. Discussions of the theoretical and practical aspects of densitometer design, operation, and data interpretation are presented. DOE

N80-13911# Los Alamos Scientific Lab., N. Mex.
GENERAL-PURPOSE HEAT SOURCE PROJECT, SPACE NUCLEAR SAFETY PROGRAM, AND RADIOISOTOPIC TERRESTRIAL SAFETY PROGRAM Progress Report, May 1979
W. J. Maraman, comp. Jul. 1979 43 p
(Contract W-7405-eng-36)
(LA-7952-PR) Avail: NTIS HC A03/MF A01

The studies related to the use of Pu-238O2 in radioisotopic power systems are reported. Research progress is reported on: (1) general purpose heat source development; (2) space nuclear safety; and (3) radioisotopic terrestrial safety. DOE

N80-13912# Oak Ridge National Lab., Tenn.
RECENT ADVANCES IN DESIGN FOR LOW AND MEDIUM-ENERGY HEAVY ION ACCELERATORS
J. A. Martin 1979 8 p refs Presented at IEEE Particle Accelerator Conf., San Francisco, 12 Mar. 1979
(Contract W-7405-eng-26)
(CONF-790327-7) Avail: NTIS HC A02/MF A01

Recent developments in the technology of electrostatic accelerators, linear accelerators, and cyclotrons for the acceleration of heavy ions are reviewed. The characteristics of each accelerator are presented. DOE

N80-13913# Los Alamos Scientific Lab., N. Mex.
TRANSFER MAP APPROACH TO THE BEAM-BEAM INTERACTION
A. J. Dragt Jun. 1979 31 p refs Presented at Symp. on Nonlinear Dyn. and the Beam-Beam Interaction, Upton, N. Y. 19 Mar. 1979 Prepared jointly with Maryland Univ., College Park
(Contract W-7405-eng-36)
(LA-UR-79-1752; CONF-790318-4) Avail: NTIS HC A03/MF A01

A model for the beam-beam interaction in ISABELLE using numerical methods and the recently developed method of transfer maps is described. The analytical transfer map calculations which account qualitatively for all the features of the model observed numerically are discussed. Preliminary evidence that within the model employed, the beam-beam interaction at its contemplated strengths should not lead to particle loss in ISABELLE is presented. DOE

N80-13914# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
LOW-COST RF SYSTEM FOR A 2-MEGAHERTZ HEAVY ION LINEAR ACCELERATOR
R. T. Sanders 10 Jan. 1979 15 p refs
(Contract EY-76-C-02-0016)

(BNL-50960) Avail: NTIS HC A02/MF A01

A low cost radio frequency power source for a low beta linear accelerator (Linac) is described. Details of the conversion of a 30 kW, 4 to 30 MHz communications transmitter to a 2 MHz parallel line resonator driver are included. Typical calculations required for the modifications and anticipated line dissipation are given. The results of actual high level operation are discussed, and power output requirements when driving a Wideroe linac are determined. DOE

N80-13915# Brookhaven National Lab., Upton, N. Y.
BNL THREE-STAGE TANDEM ACCELERATOR FACILITY
K. W. Jones 1979 13 p refs Presented at DOE/BES Res. Meeting on High Energy Atomic Phys., Manhattan, Kas., 5 Apr. 1979
(Contract EY-76-C-02-0016)
(BNL-26211; CONF-790438-2) Avail: NTIS HC A02/MF A01

An accelerator for use in atomic physics experiments which gives the experimenter free choice of the element to be accelerated, as well as the ability to specify the desired charge state and velocity is discussed. Reviewed are the present capabilities of a three stage MP tandem facility for producing beams for atomic physics research. The improvements that might be achieved with the addition of a booster accelerator are considered. DOE

N80-13916# Brookhaven National Lab., Upton, N. Y.
BUNCHED-BEAM p-p(-) AND p-p COLLISIONS
E. D. Courant and E. Keil 1978 9 p refs Presented at Workshop on Possibilities and Limitations of Accelerators and Detectors, 15 - 21 Oct. 1978
(Contract EY-76-C-02-0016)
(BNL-26240) Avail: NTIS MF A01

Collisions between bunched beams of protons and/or antiprotons are studied. It is assumed that the bunches collide head on, and that the two beams have the same number of particles N and rms beam radii sigma sub x and sigma sub y at the crossing point. The basic luminosity formula and the stored beam intensity are derived. DOE

N80-13917# Du Pont de Nemours (E. I.) and Co., Aiken, S. C.
US PROGRAM FOR THE IMMOBILIZATION OF HIGH-LEVEL NUCLEAR WASTES
J. L. Crandall 8 Jun. 1979 25 p Presented at the Am. Nucl. Soc. Meeting, Atlanta, 3-8 Jun. 1979
(Contract EY-76-C-09-0001)
(DP-MS-79-2; CONF-790602-69) Avail: NTIS HC A02/MF A01

A program developed for the term management of high level nuclear waste is described. The program is designed to immobilize the high level waste in forms that act as highly efficient barriers against radionuclide release to the disposal site and to provide technology for similar treatment of commercial high level waste in case reprocessing of commercial nuclear fuels is ever resumed. Descriptions of commercial wastes, program strategy, program expenditures, development of waste forms, evaluation and selection of waste forms, regulatory aspects of waste form selection, project schedules, and cost estimates for immobilization facilities are discussed. DOE

N80-13918# California Univ., Livermore. Lawrence Livermore Lab.
TECHNICAL CONCEPT FOR TEST OF GEOLOGIC STORAGE OF SPENT REACTOR FUEL IN THE CLIMAX GRANITE, NEVADA TEST SITE
L. D. Ramspott, L. B. Ballou, R. C. Carlson, D. N. Montan, T. R. Butkovich, J. E. Duncan, W. C. Patrick, D. G. Wilder, W. G. Brough, and M. C. Mayr 31 May 1979 73 p refs
(Contract W-7405-eng-48)
(UCID-18197) Avail: NTIS HC A04/MF A01

The spent fuel test in the Climax granite at the Nevada Test Site, a generic test in which spent fuel assemblies from an operating commercial nuclear reactor are emplaced at, and retrieved from, a plausible waste repository depth in a typical granite is described. Eleven canisters of spent fuel were emplaced in a storage drift 420 m below the surface along with six electrical simulator canisters. Two adjacent drifts contain electrical heaters which are operated so as to simulate the initial five years of the temperature stress displacement fields of a large repository. The site is described, and the preoperational measurement program and characteristics of the spent fuel are given. Both thermal and mechanical response calculations are summarized. The field instrumentation and data acquisition systems are described, as well as the system for handling the spent fuel. DOE

N80-13919# Idaho National Engineering Lab., Idaho Falls.
HEAT TRANSFER IN HIGH-LEVEL WASTE MANAGEMENT
B. R. Dickey and G. W. Hogg 1979 42 p refs Presented at the 87th AICHE Natl. Meeting, Boston, 19 Aug. 1979
(Contracts EY-76-C-07-1540; DE-AC07-76ID-01540)
(CONF-790822-1) Avail: NTIS HC A03/MF A01

Heat transfer in the storage of high-level liquid wastes, calcining of radioactive wastes, and storage of solidified wastes are discussed. processing and storage experience are summarized for defense high-level wastes; heat transfer in power reactor high-level waste processing and storage is also discussed. DOE

N80-13920# Pacifica Technology, Del Mar, Calif.
RETRIEVABLE STORAGE CONCEPT DESIGNS Final Report
Robert E. Nickell 1 Mar. 1979 28 p refs
(Contract W-7405-eng-48)
(UCRL-15018) Avail: NTIS HC A03/MF A01

The reference design of retrievable storage canisters for radioactive waste is described. The reference design is a sealed storage canister concept based upon the waste isolation pilot plant (WIPP) design, with slight modifications. The modifications consist of an alternate lifting yoke arrangement for the top head and a revised bottom head design for absorption of impact energy. The four failure modes that are deemed the most appropriate for the design of the reference canister are: (1) a loss of functional capability; (2) ductile rupture of the canister; (3) buckling of the structural members; and (4) stress corrosion cracking. Failure scenarios are provided for each of the relevant failure modes. In addition, a failure methodology based upon the distribution of demand and the distribution of capacity for the structural members, with respect to each failure mode, is given. DOE

74 OPTICS

Includes light phenomena.

N80-13921 Wisconsin Univ. - Madison.
DETERMINATION OF THE INTENSITY OF SCATTERED RADIATION AND THE PERFORMANCE OF GRIDS IN DIAGNOSTIC RADIOLOGY BY MONTE CARLO METHODS Ph.D. Thesis
Willi Alfred Kalender 1979 152 p
Avail: Univ. Microfilms Order No. 7918155

A method for determining data on scattered radiation in arbitrary radiological situations is presented. A computational method employing the Monte Carlo principle was chosen and is described in detail. The intensity of singly and multiply scattered radiation is calculated as a function of energy, field size and shape, object thickness, and object to detector distance in terms of the scatter fraction F, which is defined as the ratio of the intensities of scattered and total radiation. The energy dependence is investigated thoroughly. The influence of different detector thickness and materials on the scatter fraction results is determined. The distribution of scattered radiation in the image plane is determined under variation of the above parameters. An results are compared to available results of earlier investigations with generally good agreement. Possible applications of the method and data are briefly outlined. Dissert. Abstr.

N80-13922*# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
OPTICAL DIGITAL TECHNIQUES Final Report
Feb. 1979 226 p refs
(Contract NAS9-15051)
(NASA-CR-160392; MDC-E2052) Avail: NTIS HC A11/MF A01 CSCL 20F

Optical interface losses between transmitter-to-fiber interface, connector-to-connector interface, and fiber-to-receiver interface were studied. System effects such as pulse dispersion, risetimes of the sources and detectors, type of fibers used, output power of the sources, and detector sensitivity were considered. Data bus systems such as TEE, Star, and Hybrid were analyzed. The matter of single fiber versus bundle technologies for future avionics systems was considered. The existing data bus system on Space Shuttle was examined and an optical analog was derived for a fiber bundle system, along with the associated power margin. System tests were performed on a feasibility model of a 9-port Star data bus system including BER, star losses, connector losses, etc. The same system was subjected to EMI between the range of 200 Hz to 10 GHz at 20V/m levels. A lightning test was also performed which simulated the conditions similar to those on Space Shuttle. The data bus system was found to be EMI and lightning hard. It is concluded that an optical data bus system is feasible for shuttle orbiter type vehicles. A.R.H.

N80-13923*# Stanford Univ., Calif. Edward L. Ginzton Lab.
ANTI-STOKES EMISSION AS A VUV AND SOFT X-RAY SOURCE
S. E. Harris, J. Lukasik, J. F. Young, and L. J. Zych Jun. 1978 10 p refs
(Grant NGL-05-020-103; Contracts N00014-75-C-1175; N00014-75-C-0632)
(NASA-CR-162266; AD-A070337; GL-2819) Avail: NTIS HC A02/MF A01 CSCL 20/6

A VUV and soft X-ray light source based on spontaneous anti-Stokes scattering from atomic population stored in a metastable level is described. Unique properties of this source include: narrow linewidth, tunability, linear polarization, picosecond time scale, and quite high spectral brightness. We show how the maximum source brightness, within its narrow linewidth, is that of a blackbody at the temperature T of a metastable storage level. GRA

N80-13924# Washington Univ., St. Louis, Mo. Semiconductor Research Lab.
GaAs WAVEGUIDE DETECTOR ARRAY FOR AN IOC SPECTRUM ANALYZER Final Technical Report, 1 Jun. 1978 - 31 May 1979
31 Jul. 1979 29 p refs
(Contract N00173-78-C-0134)
(AD-A073552; Rept-64351-1) Avail: NTIS HC A03/MF A01 CSCL 14/2

Integrated optical circuits (IOCs) combining optical signal propagation with high-speed photoelectronic detection have a high potential for very fast analog or digital signal processing. A wideband, real-time spectrum analyzer using thermally grown oxides on a silicon substrate has been investigated by Anderson. Sun et al. have demonstrated the feasibility of a 3-channel time demultiplexing scheme. Data rates of 1 Mbps have been achieved using GaAs waveguide detectors, and frequency demultiplexing has also been investigated. Gallium Arsenide shows considerable promise as a semiconductor for use in IOC fabrication. A large variety of electronic and optical devices have been demonstrated in GaAs with the desirable attributes of high speed, low noise, and high efficiency. Lindley et al. have fabricated avalanche photodetectors with a large gain-bandwidth product (-50 GHz) and a signal-to-noise ratio of 30 dB. Stillman et al. have fabricated GaAs waveguides which operate with attenuation as low as 2 per cm at GaAs laser wavelengths. In addition, GaAs-AlGaAs double heterostructure lasers emitting at 9100 A have been integrated with high-purity GaAs waveguides. GRA

N80-13925# Efratom Systems Corp., Irvine, Calif.
AN INVESTIGATION OF THE TECHNICAL FEASIBILITY OF USING PULSED OPTICAL PUMPING TO ELIMINATE THE LIGHT SHIFT AND IMPROVE THE LONGTERM STABILITY OF PASSIVE RUBIDIUM FREQUENCY STANDARDS Final Report, 1 Sep. 1977 - 30 Apr. 1979
Thomas C. English and Ernst Jechart 30 Aug. 1979 58 p refs
(Contract N00014-77-C-0646)
(AD-A073757) Avail: NTIS HC A04/MF A01 CSCL 14/2

A pulsed optical pumping rubidium frequency standard has been constructed for the purpose of eliminating the light shift and investigation the long-term frequency stability in the absence of light shifts. The device used employs a very small physics package that occupies a total volume of only 260 cc. Initial measurements of the light shift for this device showed that the light shift was reduced by about an order of magnitude to approximately -1.5 times 10 to the -10th power fractional frequency shift for a 30% reduction in light intensity. Under these conditions, the square root of the Allan variance was determined to be of the order of parts in 10 to the 12th power for averaging times of 24 hrs and 48 hours. GRA

N80-13926# Naval Postgraduate School, Monterey, Calif.
EXPERIMENTAL FLIR STUDY M.S. Thesis
James Powell Gruber Jun. 1979 80 p refs
(AD-A073361) Avail: NTIS HC A05/MF A01 CSCL 17/5

A single cell, serially scanned, thermal imaging FLIR system has been constructed. The system consisted of a Cassegrain type reflecting telescope with a convergent beam, oscillating mirror scan system and HgCdTe and InSb single cell infrared detectors. The system was first tested using visible light and then switched to the infrared wavelengths. The FLIR has imaged scenes with a temperature difference of 9 K above ambient. MTF measurements have shown it to be diffraction limited by the active area of the detector crystal and the optics. GRA

N80-13927# Los Alamos Scientific Lab., N. Mex.
NONLINEAR OPTICS: PARAMETRIC AMPLIFICATION AT 16 MICROMETERS AND OSCILLATOR MODE COMPETITION
R. G. Wenzel May 1979 111 p refs
(Contract W-7405-eng-36)
(LA-7850-T) Avail: NTIS HC A06/MF A01

The parametric amplification at 16 micrometers using a CdSe optical parametric amplifier is reported. The amplifier gain bandwidth was measured and compared with theory. The second order susceptibility for CdSe at 16 micrometers was measured and compared to results obtained at other wavelengths. The distributions of longtidudinal modes of oscillation were determined for 3 configurations of an etalon narrowed CdSe OpO. A model was developed to predict the oscillation probability for OpO modes in terms of the pump intensity and duration, cavity losses, and etalon transmission. A.W.H.

N80-13928# Los Alamos Scientific Lab., N. Mex.
BROADLY TUNABLE PICOSECOND IR SOURCE
A. J. Campillo, R. C. Hyer, and S. L. Shapiro 1979 18 p refs Presented at Conf. on Optics, Los Alamos, N. Mex., 23 May 1979
(Contract W-7405-eng-36)
(LA-UR-79-1474; CONF-790529-4) Avail: NTIS HC A02/MF A01

A completely grating tuned (1.9 to 2.4 micrometers) picosecond traveling wave IR generator capable of controlled spectral bandwidth operation down to the Fourier Transform limit is reported. The generation of tunable 10 to 20 micrometers picosecond radiation by subsequent difference frequency mixing using CdSe is discussed. DOE

N80-13929# Optische Werke G. Rodenstock, Munich (West Germany). Referat Foto- und Sonderentwicklung.
MOUNTING PROCEDURE FOR HIGH QUALITY OPTICAL SYSTEMS Final Report
Peter Hanke Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1978 74 p refs In GERMAN; ENGLISH summary
(Contract BMFT-NT-1011)
(BMFT-FB-T-78-19) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15,55

The difficulties encountered in manufacturing high quality optical systems by conventional methods are set forth. Based on a number of years' experience, a mounting process was developed, up to the series production level, whereby the lenses are places in the mount and secured by a potting compound. A method of construction was designed, various measuring and positioning techniques tested, suitable potting compounds selected, and a rational potting process evolved. The calculated unit cost based on this method of fabrication compares favorably with the cost of conventional procedures. Author (ESA)

N80-13930# European Space Agency, Paris (France).
A NEW METHOD FOR THE DESIGN OF RECURSIVE DIGITAL FILTERS AND ITS FIELDS OF APPLICATION
Gerhard Hirzinger (DFVLR, Oberpfaffenhofen, West Germany) Jul. 1979 34 p refs Transl. into ENGLISH OF "Ein Neues Verfahren zum Entwurf Rekursiver Digitaler Filter und seine Anwendungsmoeglichkeiten", Rept. DLR-FB-77-69 DFVLR, Oberpfaffenhofen, West Germany, Jan. 1979
(ESA-TT-530-Rev; DLR-FB-77-69) Avail: NTIS HC A03/MF A01

A technique for the design of recursive digital filters is presented which leads to a compromise between phase and amplitude response in one design step. The computational method is derived in the time domain and is based on solving a system of equations by least squares techniques. The method may be denoted as comparatively simple. It is shown that without major complications the technique may be extended to the design differentiating and integrating filter algorithms, where the systematic design of numerical integration formulas should be of great interest. Several examples are given to demonstrate how the presented technique may be applied usefully. Particular emphasis is laid on cases which are of interest in the control and simulation of dynamical systems. Author (ESA)

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N80-13931 Texas Technological Univ., Lubbock.
PHASE MEASUREMENTS OF FAST WAVE TOROIDAL EIGENMODES Ph.D. Thesis
Stephen O. Knox 1979 99 p
Avail: Univ. Microfilms Order No. 7920376

Phase resolved techniques were used to investigate the resonances, or eigenmodes, formed when a radio frequency wave (the fast Alfven wave) propagates in a toroidal plasma. A resonant structure was formed where the parameters of the plasma and the RF excitation frequency, plus the physical dimensions of the torus determined where the eigenmodes occur. At an eigenmode, the radio frequency wave amplitude in the plasma was greatly increased due to the buildup of oscillations within the torus. The exciting source supplied only the losses due to wave dissipation in the plasma and vessel walls. The relatively large stored energy was passed back and forth between the electric and magnetic fields of the radio frequency plasma wave. A large amount of energy was coupled into the plasma at an eigenmode resource. This energy was absorbed via several mechanisms within the plasma, resulting in a gain in kinetic energy by the plasma particles. Dissert. Abstr.

N80-13932 California Univ., Los Angeles.
KINETIC THEORY OF BALLOONING INSTABILITIES Ph.D. Thesis
James Walter VanDam 1979 237 p
Avail: Univ. Microfilms Order No. 7926070

A kinetic formulation is developed for long parallel wavelength ballooning instabilities in a weakly collisional plasma confined by a sheared magnetic field of arbitrary axisymmetric toroidal geometry. Modeling electron-ion collisions with a Doughterty collision operator and assuming collisionless ions, a closed system of equations which describe both electromagnetic and electrostatic modes in the rather collisional and in the diffusive semicollisional regimes is presented. An infinite series representation for high toroidal mode number modes is derived. The general global behavior of ballooning modes is described. The small scale, rapidly varying structure is described by an ordinary differential. The stability threshold for collisional electromagnetic modes is determined by shear and by the average favorable curvature of the magnetic field. The radially extended nonlocal mode structure is described by a set of slowly varying envelope equations. Imposing a quantization condition on the radial phase quantity which serves as the eigenvalue for the local analysis yields the complete two-dimensional frequency spectrum. Dissert. Abstr.

N80-13933 Washington Univ., Seattle.
LASER DRIVEN BREAKDOWN-HEATING WAVES IN MAGNETIZED HYDROGEN Ph.D. Thesis
David Woodward Scudder 1979 177 p
Avail: Univ. Microfilms Order No. 7927867

Laser-induced gas breakdown, beam trapping, effects of radial pressure, balance and mechanisms of ionization propagation, are reviewed. The plasma columns are generated experimentally with 400 J, 1 microsecond laser pulses in hydrogen in a 100 kG solenoid. Transverse holographic interferometry, Thomson scattering of a ruby laser, streak photography, and spectroscopic techniques are used to study the columns. The plasma columns were found to grow at a velocity of approximately 10 to the seventh power cm/sec over a wide range of target densities. The temperature observed was about 70 eV at a target density of 2 x 10 to the eighteenth power electrons/cu cm. Significant results are reported which indicate that plasma heating with CO2 lasers is highly efficient when the target density and field are chosen appropriately. Dissert. Abstr.

N80-13934 Maryland Univ., College Park.
ELECTROMAGNETIC LOWER HYBRID INSTABILITIES IN AN INHOMOGENEOUS PLASMA Ph.D. Thesis
Poh Hua Ng 1979 108 p
Avail: Univ. Microfilms Order No. 7926508

The electromagnetic properties of four microinstabilities in an inhomogeneous plasma with a temperature gradient are studied analytically and numerically. The evolution of the drift cyclotron loss cone instability as the loss cone velocity distribution is progressively filled with a warm Maxwellian component is studied. The addition of the warm plasma which results in both a lowering of the growth rate and a distortion and narrowing of the frequency spectrum is discussed. Dissert. Abstr.

N80-13935 Tennessee Univ., Knoxville.
THE STUDY OF MHD INSTABILITIES IN ELONGATED TOKAMAKS Ph.D. Thesis
Chang-Hyuk An 1979 116 p
Avail: Univ. Microfilms Order No. 7927023

Fixed boundary ideal magnetohydrodynamic (MHD) instabilities were studied analytically and computationally for highly elongated axisymmetric toroidal equilibria. The analytic results for high n ballooning modes were compared with computational results obtained by using ORNL BALOON code. The computational results reveal that high elongation, low aspect ratio, and broad pressure profile enhance the marginal beta for Beta sub P less than unity but severely reduce the marginal beta for Beta sub P larger than unity for the equilibrium profiles used. Dissert. Abstr.

N80-13936 Washington Univ., Seattle.
MULTIPLE-PASS CARBON DIOXIDE LASER HEATING OF A THETA-PINCH PLASMA Ph.D. Thesis
Robert Dick Brooks 1979 150 p
Avail: Univ. Microfilms Order No. 7927751

The multiple pass experiment which consisted of a coupled optical cavity with a 20 cm long theta pinch plasma as an active element is described. A 100 joule CO2 TEA laser was used in the coupled cavity with either an eight percent reflecting NaCl output coupler or a thirty percent reflecting germanium output coupler. The NaCl output coupler emphasized the effects of the coupled cavity while the germanium coupler provided significant single pass as well as multiple pass heating. Utilizing holographic interferometry, conditions were found which resulted in the formation of a reproducible plasma with a large density minimum on axis during a major portion of the first quarter cycle of the theta pinch discharge. With the NaCl output coupler the TEA laser output was dramatically affected by the dynamics of the theta pinch plasma when fired in the multiple pass configuration. A ruby laser scattering system indicated that the temperatures reached in the multiple pass configuration were dependent upon the time of the initiation of the laser pulse.
Dissert. Abstr.

N80-13937# Argonne National Lab., Ill.
TECHNICAL SUPPORT FOR OPEN-CYCLE MHD PROGRAM Progress Report, Jul. - Dec. 1978
E. D. Doss, ed. Jun. 1979 87 p refs
(Contract W-31-109-eng-38)

(ANL/MHD-79-4) Avail: NTIS HC A05/MF A01

The development of the analytical tools needed to investigate the performance of the major components in the combined cycle MHD/steam power system is examined. The analytical effort is centered on the primary components of the system that are unique to MHD and also on the integration of these analytical representations into a model of the entire power producing system. The investigation includes modeling of the combustor, MHD channel, slag separator, and high temperature air heater. DOE

N80-13938# California Univ., Berkeley. Lawrence Berkeley Lab.

MULTIMEGAWATT NEUTRAL BEAMS FOR TOKAMAKS

W. B. Kunkel Mar. 1979 8 p refs Presented at IEEE Particle Accelerator Conf., San Francisco, 12 Mar. 1979

(Contract W-7405-eng-48)

(LBL-8891; CONF-790327-96) Avail: NTIS HC A02/MF A01

The use of high power neutral beam injectors to heat plasmas in Tokamak reactors is described. DOE

N80-13939# Oak Ridge National Lab., Tenn.

SCALING STUDIES OF BEAM-HEATED TOKAMAKS

S. C. Scott (MIT) and J. Sheffield Nov. 1978 19 p refs

(Contract W-7405-eng-26)

(ORNL/TM-6584) Avail: NTIS HC A02/MF A01

Parametric scaling of neutral beam heated Tokamaks is examined to determine the trade off between beam energy and power. It is shown that over a wide range of plasma parameters and assumed transport properties, the center mean plasma temperature is a function of P sub A E sub B(delta), where E sub B and P sub A are the beam energy and power per unit area, respectively, and delta is a calculable constant of order unity. DOE

N80-13940# Science Applications, Inc., Albuquerque, N. Mex.

TECHNICAL REVIEW OF THE SANDIA LABORATORIES' PARTICLE BEAM FUSION PROGRAM

18 May 1979 39 p

(Contract EY-76-C-04-0789)

(SAND-79-7044) Avail: NTIS HC A03/MF A01

The technical aspects of the particle beam fusion program are considered and the program's initial goals, the progress made to date towards reaching those goals, and the future plans or methods of reaching those original or modified goals are examined. A summary of the effort, which seeks to demonstrate that high voltage pulsed power generated high current electron or light ion beams is used to ignite a deuterium or tritium pellet, is provided. DOE

N80-13941# Argonne National Lab., Ill.

FUSION POWER PROGRAM Quarterly Progress Report, Oct. - Dec. 1978

Apr. 1979 94 p refs

(Contract W-31-109-eng-38)

(ANL/FPP-78-4) Avail: NTIS HC A05/MF A01

Research and development areas in nuclear fusion are presented. Areas include: materials; energy storage and transfer; tritium containment, recovery and control; advanced reactor design; atomic data; reactor safety; fusion-fission hybrid systems; and alternate applications of fusion energy. Research progress is reported for each of the following areas: (1) savings in plasma support systems for a Tokamak hybrid reactor; (2) fusion reactor safety studies; (3) energy storage and transfer; (4) test results of the 1.5 MJ pulsed superconducting coil; and (5) atomic data studies. DOE

N80-13942# California Univ., Livermore. Lawrence Livermore Lab.

EQUILIBRIUM PLASMA CORONA SURFACES

Donald L. Ensley Jul. 1979 13 p

(Contract W-7405-eng-48)

(UCID-18228) Avail: NTIS HC A02/MF A01

The distribution of charge of one sign when the opposite charge density is given is determined. Poisson's equation is solved in plane geometry for a simple specified ion density. This gives the inverse solution for a given electron density, by reversing the sign of the potential. Some solutions which approximate a microwave confined corona, for very over-dense cases are discussed. Analysis procedures are presented. DOE

N80-13943# California Univ., Livermore. Lawrence Livermore Lab.

SURFACE MOTION AND CONFINEMENT POTENTIAL FOR A MICROWAVE CONFINED CORONA

Donald L. Ensley Jul. 1979 18 p refs

(Contract W-7405-eng-48)

(UCID-18227) Avail: NTIS HC A02/MF A01

Approximate time dependent solutions for surface velocities and potentials are given for a plane polarized microwave field confining a hot, over-dense plasma corona. Steady state solutions to Poissons, equation is applied to the time dependent case, with transit time effects included. The product of ion pressure and potential wave (surface) velocity which gives an average heating rate directly to the ions is calculated. DOE

N80-13944# Oak Ridge National Lab., Tenn. Fusion Energy Div.

NFREYA: A MONTE CARLO BEAM DEPOSITION CODE FOR NONCIRCULAR TOKAMAK PLASMAS

R. H. Fowler, J. A. Holmes, and J. A. Rome Jul. 1979 27 p refs

(Contract W-7405-eng-26)

(ORNL/TM-6845) Avail: NTIS HC A03/MF A01

A computer code is described which calculates the initial fast ion deposition for neutral beam injection into noncircular Tokamak plasmas. The beam deposition is calculated by Monte Carlo techniques as a function of the poloidal flux function psi. The flux function and plasma parameters are obtained from the numerical solution of the axisymmetric MHD equilibrium equation. Bounce averages are performed over the initial ion orbits, and the deposition is weighted by the fraction of time the ion spends in each interval of the psi grid. The divergence, focusing, and shape of the neutral beam are modeled. The code described is a modification of FREYA. Comparisons of the beam depositions calculated with bounce averaging are - made with the ion birth depositions for the PDX and ISX-B Tokamaks. DOE

N80-13945# Fom-Instituut voor Plasmafysica, Jutphaas (Netherlands).

SOLUTION OF THE INITIAL VALUE PROBLEM AND ENERGY REDISTRIBUTION FOR ELECTRON AND ALFVEN WAVES IN INHOMOGENEOUS PLASMAS Thesis - Utrecht Univ.

A. E. P. M. vanMaanen-Abels Nov. 1978 95 p refs Sponsored by EURATOM and Ned. Organ. voor Zuiver-Wetenschappelijk Onderzoek (ZWO)

(Rept-78-115) Avail: NTIS HC A05/MF A01

The damping of waves in inhomogeneous plasmas caused by phase mixing of a continuous spectrum of waves and the resulting energy transport is investigated. The initial value problem is solved and the energy redistribution is found for both electron and Alfven waves in inhomogeneous plasmas. For a broad class of initial perturbations, the explicit solution of the initial value problem and the regime of its validity is given. From the time dependent solutions for the fields, the asymptotic energy density of the perturbations is derived. The redistribution of the energy as a function of the initial conditions is studied. First, this is done for a cold inhomogeneous plasma in slab geometry, then a low-beta diffuse plasma described by ideal magnetohydrodynamics in the same geometry is considered. Author (ESA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N80-13946 Stevens Inst. of Tech., Hoboken, N. J.

AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF MAGNETIC ORDERING IN YTTRIUM IRON GARNET Ph.D. Thesis

Louis Frank Dechiaro 1979 284 p

Avail: Univ. Microfilms Order No. 7925047

Laser Raman backscattering was used to experimentally study the two magnon spectrum of yttrium iron garnet (YIG) as a function of temperature both below and above the ferrimagnetic Curie temperature of 550 K. Raman spectra were obtained from single crystals of YIG using a krypton-ion laser, a double grating monochromator, and a photon counting detection system. The first observation of three new second-order Raman peaks at frequencies of 893 + or - 15/cm, 115 + or - 15/cm and 1415 + or - 15/cm. The peak at 893 + or - 15/cm is attributed to delta S = 0, two magnon mixed optic branch scattering on the basis of the temperature dependence of its intensity while the other peaks are attributed to a two phonon scattering mechanism. The observed first-order phonon spectra are in excellent agreement with previously reported experimental spectra. Dissert. Abstr.

N80-13947 Stevens Inst. of Tech., Hoboken, N. J.
FORMATION AND COALESCENCE OF EPITAXIAL CRYSTALLITES IN NICKEL ELECTRODEPOSITON IN AIR AND ARGON ATMOSPHERES Ph.D. Thesis
Kidambi Raghunathan 1979 137 p
Avail: Univ. Microfilms Order No. 7925055

The initial stages of epitaxial electrocrystallization of nickel on cube textured copper substrates were investigated in air and in argon atmospheres. The effects of additions of saccharin and phenosafranine to the electrolyte were also studied. The deposition potential was monitored during deposition and afterwards the structures of the deposits were determined by transmission electron microscopy. The initial electrocrystallization was under all conditions the formation of three dimensional epitaxial crystallites (TEC) having a lateral size of 5 to 8 nm. Three dimensional epitaxial crystallites (TEC) formed even when all preplating and plating solutions were purged of oxygen by argon bubbling and when deposition occurred under an argon atmosphere. Results indicate that TEC formation is not due to oxides on the substrate. Other significant results are reported. Dissert. Abstr.

N80-13948 Syracuse Univ., N. Y.
INITIAL EPITAXY AND INTERDIFFUSION PHENOMENA IN Au-Cu BILAYERS Ph.D. Thesis
John Eugene Macur 1979 89 p
Avail: Univ. Microfilms Order No. 7925644

The initial epitaxy and microstructure of Au-Cu bilayers was studied using transmission electron microscopy (TEM), transmission electron diffraction and reflection high energy electron diffraction. The room temperature modes of growth of Au/(111) Cu and Cu/(111) Au are described. For the former growth mode initial deposits (2.4A) of Au on Cu form smooth, flat islands delineated by coincidence lattice misfit dislocations. For 6.0A of Au deposit, both thick and thin Au areas were observed with almost complete substrate coverage. For a 10A deposit, surface coverage was complete. Strain measurements and dislocation densities obtained on the (111) Au/(111) Cu films suggest the presence of two separate misfit dislocation networks at the interface. The coincidence lattice networks were large enough for TEM observation but contributed little to total overlayer strain. Significant results are reported. Dissert. Abstr.

N80-13949 Cornell Univ., Ithaca, N. Y.
CHROMIUM DOPED SEMI-INSULATING GALLIUM ARSENIDE GROWN BY LIQUID PHASE EPITAXY Ph.D. Thesis
David William Woodard 1979 182 p
Avail: Univ. Microfilms Order No. 7926990

The technology for consistently producing buffer layers with ideal semi-insulating properties using Cr doped liquid phase epitaxy was investigated. Quantitative measurement of compensation, extraneous impurities, and deep acceptor concentration introduced by Cr doping were emphasized. Optical deep level transient spectroscopy is used to determine the Cr deep acceptor concentration in doubly doped n-type material following calibration of the procedure by measurements in n- and p-type material. The deep acceptor concentration obtained by this method was shown to be in good agreement with the amount of compensation determined by Hall measurements on Cr doped n-type material. The total ionized impurity density introduced by Cr doping was also found to correspond to the deep acceptor density. Results indicate that the growth procedures described, effectively remove all of the electrically active extraneous impurities originally present and noticeable even in spectroscopically pure Cr sources. Dissert. Abstr.

N80-13950 Virginia Univ., Charlottesville.
MELTING BEHAVIOR OF SMALL TIN CRYSTALLITES Ph.D. Thesis
Robert Alan Bayles 1979 129 p
Avail: Univ. Microfilms Order No. 7928016

Dark field electron microscope imaging was used to study the melting of individual crystallites of tin. High vacuum techniques combined with in-situ deposition of the tin reduced the specimen contamination. The melting temperature is examined in relation to the reciprocal of the radius over the entire range of sizes studied. Two distinct branches in the plot of the melting temperature versus the reciprocal of the radius were observed and it was concluded that the lower branch represented relatively uncontaminated particles while the upper branch represented particles which were partially oxidized. The role of surface curvature in the melting process is discussed. Dissert. Abstr.

N80-13951 Florida State Univ., Tallahassee.
RESISTIVITY AND HALL COEFFICIENT MEASUREMENTS OF IRON DOPED NIOBIUM DISELENIDE CRYSTALS Ph.D. Thesis
James Francis Garvin, Jr. 1979 134 p
Avail: Univ. Microfilms Order No. 7926751

A standard four lead arrangement was used to make d.c. resistivity measurements on Fe sub x NbSe2 single crystals. Two different configurations were used to measure the Hall coefficient of Fe sub x NbSe2 single crystals. The parallel configuration data indicated three distinct ranges of x values. The magnetization data at low temperatures for the crystals are dicussed in relation to the formation of a spin glass. The perpendicular configuration Hall data were compared to the parallel configuration. Room temperature X-ray diffraction data in relation changes in the crystal structure was examined. Dissert. Abstr.

N80-13952 Purdue Univ., Lafayette, Ind.
DIFFERENCE FREQUENCY MIXING IN INSULATING GaAs AND MAGNETOOPTICAL STUDIES IN Hg0.89MnO.11Te Ph.D. Thesis
Frederick Francis Geyer 1979 138 p
Avail: Univ. Microfilms Order No. 7926375

The generation of far infrared radiation by frequency mixing was studied for the case of phase matching by means of the noncollinearity of the generating beams. An exact theoretical treatment was performed for the case where the laser beams propagate linearly in the sample and for the case where the laser beams follow a zig zag path resulting from multiple internal reflections; the profile of each laser beam entering the sample is taken realistically to be a truncated Gaussian; sample absorption of the generating and generated radiations are taken into account. A single CO2 laser was modified to provide both generating beams, resulting in more consistent temporal overlap of the pulses in the two beams. An SF6 saturable absorption cell was used to select a single longitudinal mode, eliminating the fine structure in pulses of one beam and making the overlap of the pulses from the two beams tractable. Dissert. Abstr.

N80-13953 Oregon State Univ., Corvallis.
A THEORETICAL INVESTIGATION OF THE ELECTRONIC BAND STRUCTURE AND BULK PROPERTIES OF DIAMOND Ph.D. Thesis
Richard Alan Heaton 1979 69 p
Avail: Univ. Microfilms Order No. 7928214

A first principles self consistent calculation using the method of linear combination of atomic orbitals is described for diamond. The basis set was formed with optimized orbitals. The self consistent results were used to calculate the band structure, X-ray structure features, and Compton profiles. Theoretical procedures for accurately evaluating X-ray structure factors and Compton profiles are presented. Dissert. Abstr.

N80-13954 State Univ. of New York at Stony Brook.
HETERODYNE DETECTION AND GENERATION OF MICROWAVE RADIATION BY SUPERCONDUCTING MICRO-

BRIDGES IN A RESONANT STRUCTURE Ph.D. Thesis
William Hamilton Howard 1979 181 p
Avail: Univ. Microfilms Order No. 7926238

An adjustable resonant matching structure was used to couple microwave energy at 9.05 GHz into superconducting indium microbridges and microbridge arrays in a liquid helium bath. Heterodyne detection of signals at 9.05 and 10.32 GHz using the microbridge samples with an external local oscillator is described. Conversion efficiencies as high as -5 dB were measured with a single bridge. Noise temperatures of the mixer were typically 3000 to 4000 K. The observed bandwidth of the heterodyne detector was found to be narrower than the bandwidth for input coupling. Dissert. Abstr.

N80-13955 Oregon Univ., Eugene.
DEHASS-VANALPHEN MEASUREMENTS OF SPIN RESOLVED SCATTERING IN THE Cu(Mn) MAGNETIC IMPURITY SYSTEM Ph.D. Thesis
Rudolf Heinz Hendel 1979 200 p
Avail: Univ. Microfilms Order No. 7927249

Magnetic impurity systems are analyzed using spin resolved scattering data measured with the de Haas - van Alphen waveshape analysis method. The field and temperature dependence of the spin resolved scattering is compared with negative magnetoresistivity data. The behavior of the independent spins as a function of magnetic field or as a function of temperature is discussed. As a magnetic field increases, the scattering of one spin component stays approximately constant whereas the other decreases strongly. As the temperature increases the scattering of both spin components increases. The ratio of spin dependent scattering to exchange SDS/H sub ex is examined over the field and temperature range covered. Dissert. Abstr.

N80-13956 Yale Univ., New Haven, Conn.
STUDIES IN STRUCTURE AND MAGNETIC SHORT RANGE ORDER. 1: STRUCTURE IN AMORPHOUS GERMANIUM. 2: MAGNETIC INTERACTIONS IN GADOLINUM GALLIUM GARNET Ph.D. Thesis
Wayne Irving Kinney 1979 301 p
Avail: Univ. Microfilms Order No. 7927631

The atomic scale structure in amorphous germanium (a-Ge) was investigated. Inelastic neutron scattering measurements of evaporated a-Ge were compared with the calculated vibrational properties of tetrahedrally bonded, continuous random network models. X-ray diffraction experiments were performed to determine the atomic scale structure of the evaporated a-Ge sample. The measurement of magnetic interactions in gadolinium gallium garnet (GGG) and calculations to examine the thermodynamic properties of GGG are presented. The nondipolar magnetic interactions were determined for the first, second and third neighbor ions by analysis of high frequency susceptibility measurements. The measurements were performed on a single crystal sphere of GGG using an improved radio frequency susceptibility apparatus. Improvements included (1) better temperature control, (2) more stable oscillator circuitry, and (3) various high frequency shields which reduced sparious signals. The nondipolar interactions determined in the experiment were used in a Monte Carlo calculation of the specific heat.
Dissert. Abstr.

N80-13957 Virginia Univ., Charlottesville.
INELASTIC ELECTRON TUNNELING SPECTROSCOPY OF RING COMPOUNDS ON ALUMINA Ph.D. Thesis
Charles Steven Korman 1978 233 p
Avail: Univ. Microfilms Order No. 7928024

A spectroscopic technique which uses inelastic electron tunneling spectroscopy, and is sensitive to the vibrations of impurities adsorbed on surfaces, was extended to complex molecules having one or more rings adsorbed on alumina. Tunneling intensities were shown to depend upon the detailed bonding of the molecule on the surface. Modifications of the elastic component of tunneling due to adsorbed species were studied and characterized by a two trapezoidal model of the barrier. Evidence is presented for a relationship between the electron phonon coupling constants as obtained from sideband structure in photoemission studies and tunneling intensities.
Dissert. Abstr.

N80-13958 State Univ. of New York at Stony Brook.
PLANAR JOSEPHSON JUNCTION RADIATION DETECTOR Ph.D. Thesis
Inor Taras Wacyk 1979 195 p
Avail: Univ. Microfilms Order No. 7928084

The radiation detection properties of a planar thin film Josephson junction device is investigated. The junction is fabricated along the edge of the base electrode film, resulting in a contact area whose normal is in the plane of the substrate. The Josephson devices, formed as an integral part of a microstrip transmission line to facilitate the coupling of microwave radiation into the junction, are described. The supercurrent frequency response and current steps in the dc current-voltage characteristic are examined. Dissert. Abstr.

N80-13959 Yale Univ., New Haven, Conn.
POLARIZATION PARAMETER MEASUREMENT FOR K+p ELASTIC SCATTERING BELOW 1 Ge/V/c Ph.D. Thesis
Barry Ray Lovett 1979 155 p
Avail: Univ. Microfilms Order No. 7927640

Polarization parameters in K(+)p elastic scattering from polarized protons were measured at incident kaon momenta of 650, 700, 845, and 940 MeV/c. A butanol type target was cooled to 0.55 K by a He3-He4 refrigerator system, and the free protons were polarized by the method of dynamic nuclear orientation. The scattered particles were detected by a scintillation counter proportional wire chamber system. The data are parametrized by Legendre polynomial expansions, and comparisons are made with predictions of partial wave analyses.
Dissert. Abstr.

N80-13960 Washington Univ., Seattle.
THERMAL FACETING BEHAVIOR OF SINGLE CRYSTAL ALUMINUM OXIDE Ph.D. Thesis
Edward Hjalmar Randklev 1979 195 p
Avail: Univ. Microfilms Order No. 7927856

The thermal faceting behavior of polished surfaces of nominally undoped, and selectively doped, single crystal aluminum-oxide was characterized both qualitatively and quantitatively. Flame grown (Vernueil), melt grown (Czochralski), and a limited number of vapor grown crystals were investigated. Three forms of thermal facets occurred within orientation fields around several major crystallographic indexes in the system during high temperature heat treatment (1300 C - 2000+ C) under various atmospheres (vacuum oxygen, air, argon, and argon-hydrogen). For nominally undoped crystals, major thermal faceting fields of approximately 32 deg and approximately 21 deg were identified relative to the (c) /0001/ and (+ or - A) /11(-2)0/ orientations, respectively, and minor faceting fields of approximately 12 deg and approximately 5 deg were identified relative to the (r) /10(-1)1/ and (R) /10(-1)2/ orientations, respectively. The (c) /0001/ and (+ or - A) /11(-2)0/ facet systems were also observed in all but one of the selectively doped sapphire materials.
Dissert. Abstr.

N80-13961 Northwestern Univ., Evanston, Ill.
EFFECT OF ELECTRON IRRADIATION ON THE STRENGTH OF NIOBIUM SINGLE CRYSTALS Ph.D. Thesis
Johsei Nagakawa 1979 165 p
Avail: Univ. Microfilms Order No. 7927409

The effect of electron irradiation on the plastic deformation of niobium single crystals was investigated at temperatures between 4.2 K and 77 K. Two different tensile axis orientations were chosen, i.e., one at the center of the standard triangle (designated as C) and the other on the /100/-/111/line, 45 degrees from the primary Burgers vector (designated as H). The C crystal deformed by the anomalous slip and the H crystal deformed by the primary slip. A significant difference in the deformation behavior between C and H crystals without irradiation is described. The effect of room temperature prestraining on the two crystals is discussed. Dissert. Abstr.

N80-13962 Yale Univ., New Haven, Conn.
DUAL PHOTOCONDUCTIVITY EFFECTS INDUCED BY THE INTERSUBBAND TRANSITIONS IN N-TYPE SILICON INVERSION LAYERS Ph.D. Thesis
Chih Chun Hu 1979 192 p
Avail: Univ. Microfilms Order No. 7926252

The physical mechanism of photoconductivity in n-channel MOSFET on (100) surface of silicon is investigated. The photoresponse, a combination of photoresistive intersubband transition, the resonant bolometric heating, and a Drude heating background is examined. Intersubband transitions observed in absorption, photoconductivity, and emission experiments are discussed. A discrepancy between the values of the resonant energy for the transitions between the ground subband and the excited subband is examined. Dissert. Abstr.

N80-13963 Pennsylvania Univ., Philadelphia.
EXPERIMENTAL INVESTIGATION OF THE ABSOLUTE TUNNELING CURRENT DENSITY IN FIELD EMISSION FROM TUNGSTEN (110) Ph.D. Thesis
Charles David Ehrlich 1979 154 p
Avail: Univ. Microfilms Order No. 7928123

The phenomenon of quantum mechanical tunneling of an electron through a barrier in the potential energy is discussed. The absolute current density is measured using the direct method of vacuum field emission from the (110) crystal face of a tungsten field emitting tip. The technique of vacuum field emission which involved the application of a high voltage between a fine metal wire that was etched to a sharp tip, and an anode, under ultrahigh vacuum conditions is described. The Fowler-Nordheim analysis for a free electron metal was used in order to translate the applied voltage into the electric field at the tip. The success of a free electron model in explaining emission from a transition metal surface is discussed. Calculations show that the bands contributing field emission current in the (110) direction have a large free electron component. This aspect of the analysis is examined in detail. Dissert. Abstr.

N80-13964 Polytechnic Inst. of New York.
SURFACE-WAVE SCATTERING BY DIELECTRIC GRATINGS WITH ARBITRARY PROFILES Ph.D. Thesis
Kai-Chiang Chang 1979 148 p
Avail: Univ. Microfilms Order No. 7920771

The guiding and scattering of electromagnetic surface waves by dielectric gratings having arbitrary profiles is investigated. The particular configurations considered assume that the grating is superimposed on a thin dielectric film backed by a thick substrate, so that both surface and leaky waves are supported. The relevant boundary value problem is examined by means of an exact solution, as well as by a simpler perturbation solution that lends itself to physical interpretation in terms of equivalent networks. The study reveals that a grating having a properly shaped right angled triangular profile can selectively radiate the power from an incident surface wave into either the air region above the grating or into the substrate below it. By viewing the grating as part of an extended two dimensional lattice, this directional discrimination is explained in terms of a Bragg reflection mechanism. A discussion of the mechanism in relation to improving the operation of optical beam couplers is presented. Dissert. Abstr.

N80-13965# Ballistic Research Labs., Aberdeen Proving Ground, Md.
SOLITARY WAVE PROPAGATION IN THE THREE-DIMENSIONAL LATTICE
Jad H. Batteh and John D. Powell May 1979 42 p refs
(DA Proj. 1L1-61102-AH-43)
(AD-A071458; ARBRL-TR-02164; AD-E430261) Avail: NTIS HC A03/MF A01 CSCL 20/2

The properties of solitary waves in a three-dimensional, monatomic, face-centered cubic lattice are studied. The atoms of the lattice are assumed to interact via a Morse-type interatomic potential. For the discrete lattice, the equations of motion for the atoms are solved numerically using a computer-molecular-dynamic technique and, from their solution, the stability of the waves investigated. It is pointed out that the solitary waves are fairly stable to longitudinal planar oscillations, somewhat less stable to mutual collisions, and still less stable to transverse planar oscillations. It is also observed that under some conditions coupled longitudinal and transverse solitary waves can propagate in phase with the same propagation velocity in the lattice. The equations of motion are then derived in the long-wavelength, continuum limit and studied in some detail. A comparison of their solutions is made with the results for the discrete-lattice model and it is shown that the continuum equations are capable of predicting many of the same effects. GRA

N80-13966# Cornell Univ., Ithaca, N. Y. School of Electrical Engineering.
TRANSIENT PHENOMENA IN ELECTRON TRANSPORT IN SEMICONDUCTORS Final Report
31 Jan. 1979 22 p refs
(Grant AF-AFOSR-2717-74)
(AD-A073009; AFOSR-79-0928TR) Avail: NTIS HC A02/MF A01 CSCL 20/12

Theoretical efforts at understanding the band structure of, and hence electron transport in, alloy semiconductor materials are described. In particular, calculations of band structure and transient and equilibrated velocity-field relationships are being performed for Ga(x)In(1-x)As and Ga(x)In(1-x)AsyP(1-y), materials which may be suitable for fast logic or microwave devices. Methods for describing pseudopotential variations and chemical disorder in alloys are discussed. GRA

N80-13967# Bendix Corp., Kansas City, Mo.
ELECTRON MICROPROBE ANALYSIS OF TANTALUM-NITRIDE THIN FILMS
D. L. Stoltz and J. P. Starkey Jun. 1979 18 p refs
(Contracts EY-76-C-04-0613; DE-AC04-76DP-00613)
(BDX-613-1198-Rev) Avail: NTIS HC A02/MF A01

Quantitative chemical analysis of 500 and 2000 angstrom tantalum-nitride films on glass substrates is reported using an electron microprobe X-ray analyzer. Modifications to the microprobe are described. A description of the calibration procedure, the method of analysis, and the quantitative results are discussed. DOE

N80-13968# California Univ., San Diego, La Jolla. Dept. of Physics.
ABSENCE OF CRYSTALLINE ORDER IN TWO-DIMENSIONS Technical Report, 15 Sep. 1978 - 24 Aug. 1979
Sudip Chakravarty and Chandan Dasgupta Aug. 1979 7 p refs
(Contract N00014-76-C-0050)
(AD-A073672; TR-51) Avail: NTIS HC A02/MF A01 CSCL 07/4

It is proved that in two dimensions a system of electrons embedded in a uniform neutralizing positive background and interacting by a potential given by e-squared/r, cannot exhibit long range crystalline order at any finite temperature. GRA

N80-13969# California Univ., San Diego, La Jolla. Dept. of Physics.
A UNIVERSAL MODEL FOR THE SURFACE ENERGY OF SOLIDS Technical Report, 15 Jun. 1978 - 15 Jul. 1979
Walter Kohn and A. Yaniv Jul. 1979 25 p refs
(Contract N00014-76-C-0050)
(AD-A073671; TR-50) Avail: NTIS HC A02/MF A01 CSCL 07/4

A universal model for computing the surface energy of solids is presented. The theory of surface energy is reviewed. The basic premise in the model, the surface energy is regarded as the work done in reversibly cleaving a bulk solid along some crystallographic plane, is described. A number of approaches are discussed and differences in this model with other approaches are delineated. A.W.H.

N80-13970# Argonne National Lab., Ill.
TRANSPORT PROPERTIES OF THE COMPOSITIONALLY MODULATED ALLOY Cu/Ni
I. Schuller, C. M. Falco, J. Hilliard (Northwestern Univ., Evanston, Ill.), J. Ketterson (Northwestern Univ., Evanston, Ill.), B. Thaler (Northwestern Univ., Evanston, Ill.), R. Lacoe (California Univ., Los Angeles), and R. Dee (California Univ., Los Angeles) 1979 6 p refs Presented at Intern. Conf. on Modulated Structures, Kailua-Kona, Hawaii, 22 Mar. 1979
(Contract W-31-109-eng-38)
(CONF-790341-8) Avail: NTIS HC A02/MF A01

Preliminary transport measurements, electrical resistivity, thermopower, Hall effect and magnetoresistance, of a number of Cu/Ni composition modulated alloy films over the temperature range 10 to 300 K and for magnetic field up to 70 kGauss are

reported. The results indicate nonmonotonic dependence of the transport properties on the modulation amplitude. The Hall coefficient saturates around 40 kGauss in contrast to the transverse magnetoresistance which does not show evidence for saturation up to 70 kGauss. DOE

N80-13971# Brookhaven National Lab., Upton, N. Y.
DETERMINATION OF THE VACANCY FORMATION ENTHALPY FOR HIGH PURITY Ni
K. G. Lynn, C. L. Snead, Jr., J. J. Hurst, and K. Farrell (Oak Ridge Natl. Lab., Tenn.) 1979 6 p refs Presented at 5th Intern. Conf. on Positron Annihilation, Lake Yamanaka, Japan, 8 Apr. 1979
(Contract EY-76-C-02-0016)
(BNL-26191; CONF-790437-11) Avail: NTIS HC A02/MF A01

Positron annihilation lifetime measurements, performed on pure nickel over the temperature range 4.2 to 1700 K, are examined. The monovacancy formation enthalpy and the temperature dependence of the positron lifetime before the onset of vacancy trapping are discussed. Possible mechanisms affecting the observed lifetime, such as thermal expansion, lattice vibration, self trapping, and shallow impurity traps are investigated. A.W.H.

N80-13972# Syracuse Univ., N. Y. Dept. of Chemical Engineering and Materials Science.
EPITAXY AND MISFIT DISLOCATIONS IN LARGE MISFIT SYSTEMS
R. W. Vook 1979 26 p refs Presented at Intern. Conf. on Met. Coatings, San Diego, Calif., 23 Apr. 1979
(Contract EG-77-S-02-4496)
(CONF-790442-17) Avail: NTIS HC A03/MF A01

The manner in which an epitaxial overgrowth is accommodated to a substrate composed of a different material is examined. The dependence of epitaxial overgrowth on such factors as the surface and interfacial energies and the lattice misfit is discussed. DOE

N80-13973# Los Alamos Scientific Lab., N. Mex.
PHOTONIC COMPRESSION
J. W. Shaner 1979 8 p refs Presented at the 7th Intern. AIRAPT Conf., La Creusot, France, 30 Jul. 1979
(Contract W-7405-eng-36)
(LA-UR-79-2040) Avail: NTIS HC A02/MF A01

Lasers developed for fusion applications which have the capability of creating pressures in excess of 100 Mbar in the laboratory are discussed. The capability of these lasers for making high pressure equation of state measurements, progress toward that goal, and the problems which stand in the way are reviewed. DOE

N80-13974# Sandia Labs., Albuquerque, N. Mex.
SELECTED PAPERS ON PIEZOELECTRICITY AND IMPULSIVE 'PRESSURE' MEASUREMENTS
R. A. Graham, ed. and R. P. Reed, ed. Dec. 1978 219 p refs Presented at the Comm. on Dyn. Measurements Soc. for Exptl. Stress Analysis, Indianapolis, Ind., 24 Oct. 1978
(Contract EY-76-C-04-0789)
(SAND-78-1911) Avail: NTIS HC A10/MF A01

Sixteen papers are presented on piezoelectricity and impulsive pressure measurements. Topics include the dynamic yield behavior of explosively loaded metals determined by a quartz transducer technique, mechanical and piezoelectric properties of shock loaded x-cut quartz, and conductivity in shock loaded x-cut quartz. A.W.H.

N80-13975# Illinois Univ., Urbana. Dept. of Physics.
INTERSTITIAL-IMPURITY TRAPPING IN Al-Fe AND Al-Zn Ph.D. Thesis
Kenneth Lowell Hultman 1979 147 p refs
(Contract EY-76-C-02-1198)
(COO-1198-1267) Avail: NTIS HC A07/MF A01

Ultrasonic attenuation and velocity measurements were made as a function of polarization, temperature, frequency, and annealing before and after electron irradiation near 65 K of Al-Fe and Al-Zn dilute alloys. Multiple relaxation processes were observed in both alloys. In the case of Al-Zn, the simultaneous annealing near 130 K of resistivity diaelastic modulus changes, and a paraelastic relaxation peak in C prime allows for a characterization of the individual defects. The results provide strong evidence that below 130 K, the <100>-mixed dumbbell is the predominant interstitial trapping configuration. A second trapping configuration present in low concentration anneals out near 100 K, and probably arises from <111>-mixed defects. In Al-Fe, the observation of the diaelastic effect and a peak in the C prime mode not previously seen in earlier internal friction measurements, together with an identification of this peak with the major defect species resolves the apparent contradiction between the internal friction and channeling symmetry evidence. DOE

N80-13976# California Univ., Berkeley. Lawrence Berkeley Lab.
MICROSTRUCTURE, SINTERING AND STRENGTH OF POLYCRYSTALLINE SiC M.S. Thesis
M. F. Sung Jun. 1979 68 p refs
(Contract W-7405-eng-48)
(LBL-9257) Avail: NTIS HC A04/MF A01

The compound SiC sintered with additions of 1% boron and 1% carbon is examined. The roles of these dopants and the related sintering mechanism are discussed. A model which suggests that boron and carbon form a boundary phase which is the diffusion path during sintering is developed. A correlation of the microstructure of the samples supplied to their different mechanical strength versus temperature behaviors and to the sintering mechanism is discussed. A.W.H.

N80-13977# Oak Ridge National Lab., Tenn. Solid State and Chemistry Div.
PROPERTIES OF SINGLE CRYSTAL BETA-ALUMINAS
J. B. Bates, G. M. Brown, T. Kaneda, W. E. Brundage, J. C. Wang, and Herbert Engstrom 1979 19 p refs Presented at the Fast Ion Transport in Solids-Electrode and Electrolytes Conf., Lake Geneva, Wis., 21 May 1979
(Contract W-7405-eng-26)
(CONF-790538-9) Avail: NTIS HC A02/MF A01

The crystal growth of sodium beta alumina through slow evaporation of Na2O3 at 1690C from a mixture of Na2CO3, MgO, and A12O3 is described. Studies of this material and of Li, K, Rb, and Ag are surveyed. The results of model calculations, made in order to interpret the Raman scattering from sodium beta alumina and to understand the conduction mechanism in this material, are presented. The structure of an Ag beta alumina single crystal was investigated by neutron diffraction. A.W.H.

N80-13978# General Electric Co., Schenectady, N. Y.
CHARACTERIZATION OF HEAT TREATMENT INDUCED CHANGES IN Li-Na BETA-ALUMINA SINGLE CRYSTALS
R. R. Dubin, J. S. Kasper, J. B. Bates, and T. Kaneda 1979 19 p refs Presented at the Fast Ion Transport in Solids-Electrode and Electrolytes Conf., Lake Geneva, Wis., 21 May 1979
(Contract W-7405-eng-26)
(CONF-790538-6) Avail: NTIS HC A02/MF A01

Single crystals of lithium-sodium beta alumina with 40 to 95% substitution of Li(+) for Na(+) were annealed in air and in vacuum at temperatures up to 1000 C. The specimens were examined before and after each heat treatment by pulsed NMR, Raman scattering, infrared absorption, and X-ray diffraction. After annealing at 600 C or above, the two original Raman bands due to Li-7(+) vibrations merged into a single peak accompanied by a narrowing of spinel block phonon bands. The 1000 C annealing introduced a broad Li - 7 (+) NMR response and substantially reduced narrow line Li-7(+) intensity. X-ray diffraction patterns showed that a second phase grows epitaxially with the beta-alumina structure as a result of high temperature heat treatment. The thermal induced changes observed are due to diffusion of lithium out of the conducting plane and into the spinel-block. DOE

N80-13979# Brookhaven National Lab., Upton, N. Y.
COMPARISON OF PROCEDURES FOR QUANTITATIVE X-RAY ANALYSIS IN THIN FILMS
R. Sabatini and C. S. Pand 1979 14 p refs Presented at the 14th Ann. Meeting of the Microbeam Analysis Soc., San Antonia, Tex., 13 Aug. 1979
(Contract EY-76-C-02-0016)

(BNL-25759; CONF-790813-2) Avail: NTIS HC A02/MF A01

The research showed that: (1) for the case of microanalysis of 304 stainless steel, the Cliff-Lorimar technique and the Super ML Fitting technique seem to give equally reliable results; (2) the bulk standards present a problem, in that, if a standard is not a pure element, the correction factors using ZAP at 120 kV could be very large. The absorption effect for pure elements has to be either measured or calculated for the operating conditions; (3) the MTF program did not produce results that were as reliable as the first two. The most likely explanation for this is that the Cr in the sample is fluorescing; and (4) thickness greater or equal to 1000 A does not affect the relative X-ray intensities. DOE

N80-13980# AEG-Telefunken, Heilbronn (West Germany). Geschaeftsbereich Halbeiter.

EPITAXY AT REDUCED TEMPERATURES Final Report

Peter Duro Braun Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1978 95 p refs In GERMAN; ENGLISH summary (Contract BMFT-NT-0552)

(BMFT-FB-T-78-52) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19,75

Two different processes for epitaxial deposition of silicon at reduced temperatures are reported on. The first process is based on chemical vapor deposition from silane. In connection with a programmable dopant dosage control system, epitaxial layers can be produced with the desired dopant profiles. The second process uses a silicon/iodine transport system and leads to selective epitaxial deposition of silicon on a partially masked silicon substrate. Materials obtained using these processes are discussed and their dielectric characteristics are shown to be in good agreement with the desired results. Author (ESA)

N80-13071# Academy of Sciences (USSR), Moscow.

STRUCTURAL AND PHYSICAL CHARACTERISTICS OF InSb SINGLE CRYSTALS GROWN UNDER NEAR-ZERO GRAVITY CONDITIONS

F. R. Khashimov et al *In* ESA Mater. Sci. in Space Jun. 1979 p 9-15 refs (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13072# Academy of Sciences (USSR), Moscow.

THE INFLUENCE OF SPACE CONDITIONS ON DIRECTIONAL CRYSTALLIZATION OF GERMANIUM AND ITS PROPERTIES

E. V. Markov et al *In* ESA Mater. Sci. in Space Jun. 1979 p 17-23 refs (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13075# Academy of Sciences (USSR), Moscow.

CRYSTAL GROWTH FROM THE VAPOR PHASE WITH AN INERT COMPONENT PRESENT

S. I. Aladiev and A. S. Okhotin *In* ESA Mater. Sci. in Space Jun. 1979 p 41-45 refs (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13079# Freiburg Univ. (West Germany).

PREPARATORY EXPERIMENTS FOR THE GROWTH OF SILICON SINGLE CRYSTALS IN THE MIRROR HEATING FACILITY OF SPACELAB

A. Eyer and R. Nitsche *In* ESA Mater. Sci. in Space Jun. 1979 p 75-79 refs Sponsored by West Germany Federal Min. for Res. and Technol. (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13096# Academy of Sciences (USSR), Moscow. Inst. of Space Research.

EXPERIMENT MORAVA ON BOARD SALYUT 6

C. Barta (Acad. of Sci., Prague), J. Trnka (Acad. of Sci., Prague), A. Triska (Acad. of Sci., Prague), V. I. Khrjapov, A. S. Ochotin, and I. A. Zubritskij *In* ESA Mater. Sci. in Space Jun. 1979 p 215-219 refs (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13107# Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.

NONSTATIONARY ANALYSIS OF THE MACROSEGREGATION DURING THE SOLIDIFICATION IN THE SPACE OF THE SYSTEM Ge-Ga [ANALYSE NON STATIONNAIRE DE LA MACROSEGREGATION PENDANT LA SOLIDIFICATION DANS L'ESPACE DU SYSTEME Ge-Ga]

J. J. Favier, P. Arragon, E. P. Martin (MIT), and A. F. Witt (MIT) *In* ESA Mater. Sci. in Space 1979 p 306-308 refs In FRENCH (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13108*# Rensselaer Research Corp., Troy, N. Y. Dept. of Materials Engineering.

CONVECTIVE HEAT TRANSFER DURING DENDRITIC GROWTH

M. E. Glicksman and Shyh-Chin Huang *In* ESA Mater. Sci. in Space Jun. 1979 p 309-312 refs Sponsored by NASA (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120 CSCL 22A

N80-13116# Clermont-Ferrand Univ. (France). Lab. de Cristallographie et Physique des Milieux Condenses.

RESULTS OF FRENCH EXPERIMENTS ON CRYSTAL GROWTH FROM A VAPOR PHASE CONDUCTED ON THE GROUND AS A PART OF THE SPACE PROGRAM [RESULTATS DES EXPERIENCES FRANCAISES DE CROISSANCE EN PHASE VAPEUR EFFECTUEES AU SOL DANS LE CADRE DES PROJETS SPATAUX]

R. Cadoret *In* ESA Mater. Sci. in Space Jun. 1979 p 363-367 refs In FRENCH Sponsored by CNES (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

N80-13117# Stuttgart Univ. (West Germany). Physikalisches Inst.

SOME 3-5-SEMICONDUCTOR CRYSTALS GROWN BY THE TRAVELING-HEATER METHOD

K. W. Benz and G. Mueller (Erlangen-Nuremberg Univ.) *In* ESA Mater. Sci. in Space Jun. 1979 p 369-373 refs Sponsored by Bundesmin. fuer Forsch. u. Technol. (For primary document see N80-13069 04-12)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N80-13105# Naples Univ. (Italy).

THERMODYNAMICS AND DYNAMICS OF LINE PHASES

L. G. Napolitano *In* ESA Mater. Sci. in Space Jun. 1979 p 289-296 refs (For primary document see N80-13069 04-12) (Contract CNR/SAS-77-0061)

Avail: NTIS HC A20/MF A01; ESA, Paris FF 120

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N80-13981 Clemson Univ., S.C.
DERIVATION OF A QUANTITATIVE MODEL TO ASSESS THE PERFORMANCE OF RESEARCH AND DEVELOPMENT ORGANIZATIONS Ph.D. Thesis
Wilhelm Andreas Haberkorn 1979 186 p
Avail: Univ. Microfilms Order No. 7925090

A methodology to derive estimates of research and development income is developed. The key element is a research and development revenue model which allows the user to classify research activities according to predetermined criteria. Portions of the model are used to evaluate the performance of an actual research organization. The results indicate that the proposed methodology is promising for practical application. Dissert. Abstr.

N80-13982*# Information Planning Associates, Inc., Gaithersburg, Md.
THE WORK REQUEST SYSTEM OF A NASA Q1 PACKAGE
15 Nov. 1979 61 p
(Contract NASw-3176)
(NASA-CR-162511) Avail: NTIS HC A04/MF A01 CSCL 05A

A computer package is described which can be used to track any type of work that is controlled on the basis of work requests and purchase orders/contracts. Run on any NASA QI, using floppy disks only, the system can handle about 1,200 requests per year, and provides performance and summary reports for management. The milestones tracked at Goddard are described as well as directions for installing the system. Sample reports and operator instructions are included. A.R.H.

N80-13983# Royal Aircraft Establishment, Farnborough (England).
THE GEORGE 3 AND 4 ACCOUNTING SYSTEM
Irene M. Cummings London HMSO Jul. 1978 74 p refs (RAE-TR-78080; RAE-Math-Comp-233; BR66077) Avail: NTIS HC A04/MF A01

A comprehensive system for accounting for computer usage was developed for running under the George Operating System on the ICL 1904A and 1906S computers. It allows any resource to be accounted for and has been running successfully for the last three years. The mechanism of the accounting system is described in detail and the choice of resources actually accounted for as well as charges made are discussed. Author (ESA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N80-13984# Raytheon Co., Wayland, Mass. Equipment Div.
PAVE PAWS MODERN PROGRAMMING DATA COLLECTION SYSTEM Final Technical Report, Jul. 1977 - Feb. 1979
Benson H. Scheff, W. B. Vodges, and N. R. Hall Griffiss AFB RADC Jun. 1979 100 p
(Contract F30602-77-C-0141)
(AD-A073357; RADC-TR-79-137) Avail: NTIS HC A05/MF A01 CSCL 09/2

This report describes the software development technologies which were utilized on the PAVE PAWS project and the techniques which were implemented to collect data to support on-going independent technology studies. At the request of the contracting agency, the emphasis of this report is on describing the software technology used on PAVE PAWS and providing an assessment of the effectiveness of those techniques. GRA

N80-13985# California Univ., Livermore. Lawrence Livermore Lab.
SCIENTIFIC LITERATURE: CAN WE KEEP IT FROM RUINING SCIENCE
H. L. Lentzner 24 Aug. 1978 15 p refs Presented at ACS Western Regional Meeting, San Francisco, Calif., 27 Sep. 1978
(Contract W-7405-eng-48)
(UCRL-81118; CONF-780976-1) Avail: NTIS HC A02/MF A01

The writing ability of authors specializing in scientific subjects was questioned. It was concluded that authors must carefully define their audience, thoughtfully organize their material, use concrete words, use the active voice, and take time to revise, and teachers and referees should be less tolerant of students and colleagues who write badly. DOE

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N80-13986*# Boeing Commercial Airplane Co., Seattle, Wash.
ECONOMIC STUDY OF MULTIPURPOSE ADVANCED HIGH-SPEED TRANSPORT CONFIGURATIONS Final Report
Nov. 1979 61 p refs
(Contract NAS1-14623)
(NASA-CR-159126; D6-48725) Avail: NTIS HC A04/MF A01 CSCL 05C

A nondimensional economic examination of a parametrically-derived set of supersonic transport aircraft was conducted. The measure of economic value was surcharged relative to subsonic airplane tourist-class yield. Ten airplanes were defined according to size, payload, and speed. The price, range capability, fuel burned, and block time were determined for each configuration, then operating costs and surcharges were calculated. The parameter with the most noticeable influence on nominal surcharge was found to be real (constant dollars) fuel price increase. A change in SST design Mach number from 2.4 to Mach 2.7 showed a very small surcharge advantage (on the order of 1 percent for the faster aircraft). Configuration design compromises required for an airplane to operate overland at supersonic speeds without causing sonic boom annoyance result in severe performance penalties and require high (more than 100 percent) surcharges. A.R.H.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation*, and *44 Energy Production and Conversion*.

N80-13987 Kansas Univ., Lawrence.
EVALUATION OF SURFACE AERATOR APPLICATIONS IN

THE ACTIVATED SLUDGE PROCESS Ph.D. Thesis
Valery N. Wahbeh 1979 199 p
Avail: Univ. Microfilms Order No. 7925876

Sludge plants utilizing surface aeration equipment with a total of 32,000 installed horsepower were evaluated in an attempt to review design practices in the areas of aesthetics, testing procedures, and methods of analysis and evaluation. Aesthetic conditions of the installations were reviewed. Many of he installations were aesthetically unacceptable because of spray and mist generated by the aerators. The causes of this condition were studied and remedies were suggested. In evaluating the raw data of performance tests by both the steady and nonsteady methods, new methods of analysis were developed. Recommendations for the design of surface aerator installations for aesthetic considerations and for methods of analysis and evaluation were made. Dissert. Abstr.

N80-13988# Committee on Science and Technology (U. S. House).
OVERSIGHT: FAA R AND D PROGRAMS
Washington GPO 1978 82 p refs Hearing before Subcomm. on Transportation, Aviation and Weather of the Comm. on Sci. and Technol., 95th Congr., 2d Sess., 24 Aug. 1978
(GPO-38-212) Avail: Subcomm. on Transportation, Aviation and Weather

Major research and development projects related to increased automation in air traffic control, aircraft capacity, airspace use, and safety levels are considered as well as the rationale and timing of new technology. Particular emphasis is given to the use of microwave landing systems, the discrete address beacon system, and the automated traffic advisory and resolution service. The problems of California airports and collision avoidance are explored. A.R.H.

N80-13989*# Mechanical Technology, Inc., Latham, N. Y. Stirling Engine Systems Div.
ASSESSMENT OF THE STATE OF TECHNOLOGY OF AUTOMOTIVE STIRLING ENGINES
Sep. 1979 329 p refs
(Contracts DEN3-32; EC-77-A-31-10040)
(NASA-CR-159631; DOE/NASA/0032-79/4; MTI-79ASE77RE2) Avail: NTIS HC A15/MF A01 CSCL 13F

The current status of automotive Stirling engine technology is considered. The energy is described and the history of its evolution is reviewed. Overall engine, component, subsystem and material problem areas are identified and recommendations are made for further development and testing. Potential improvements are also identified. Projected Stirling engine/vehicle performance is compared to that of vehicles using current internal combustion engine in terms of performance, fuel consumption, multifuel capability, emissions, and noise level. It is concluded that the potential for achieving 1984 program goals is clearly discernible. The program goals require at least a 30 percent reduction in fuel consumption, acceptable emissions, and the capability of satisfactorily operating with a variety of alternate fuels. A.R.H.

N80-13990# California Univ., Livermore. Lawrence Livermore Lab.
FEDERAL LABORATORY CONSORTIUM FOR TECHNOLOGY TRANSFER. FAR WEST REGION LOCAL GOVERNMENT ASSISTANCE TASK FORCE Progress Report
C. F. Miller, ed. and A. A. Sjoholm, ed. Mar. 1979 45 p
(Contract W-7405-eng-48)
(UCID-18037-79-2; PR-2) Avail: NTIS HC A03/MF A01

The needs and problems of local government administrators due to the passage of Proposition 13 are considered in terms of methodologies by which the Federal Laboratory Consortium can increase the level of assistance it is providing. Special emphasis is given to the Energy Link Project and the Stress Disability Retirement Project. Applications of current technology and methods of transferring technology developed can be used in other jurisdictions. DOE

N80-13991# Systems Technology Corp., Xenia, Ohio.
A TECHNICAL AND ECONOMIC EVALUATION OF THE PROJECT IN BALTIMORE, MARYLAND, VOLUME 2 Progress Report, 1 Oct. 1975 - 30 Apr. 1978
Jun. 1979 345 p refs
(Contract EPA-68-01-4359)
(PB-297871/6; EPA-530/SW-175C.2) Avail: NTIS HC A15/MF A01 CSCL 13B

Problems encountered in the operation of a plant designed to thermally process (pyrolyze) 907 Mg (1000 tons) per day of mixed municipal solid waste, convert it to energy (in the form of steam), and recover magnetic metals and glassy aggregate are considered. GRA

N80-13992# Systems Technology Corp., Xenia, Ohio.
A TECHNICAL AND ECONOMIC EVALUATION OF THE PROJECT IN BALTIMORE, MARYLAND, VOLUME 3 Progress Report, 1 Oct. 1975 - 30 Apr. 1978
Jun. 1979 404 p
(Contract EPA-68-01-4359)
(PB-297872/4; EPA-530/SW-175C.3) Avail: NTIS HC A18/MF A01 CSCL 13B

Contents: kiln model description; mass and energy balance; economic evaluation; and kiln model computer program. A.R.H.

N80-13993# Systems Technology Corp., Xenia, Ohio.
A TECHNICAL AND ECONOMIC EVALUATION OF THE PROJECT IN BALTIMORE, MARYLAND, VOLUME 4 Technical Report, 1 Oct. 1975 - 30 Apr. 1978
Jun. 1979 97 p refs
(Contract EPA-68-01-4359)
(PB-297873/2; EPA-530/SW-175C.4) Avail: NTIS HC A05/MF A01 CSCL 13B

A complete technical, economic, and environmental evaluation is presented for a demonstration mixed-solid processing plant. Problems associated with most of the major innovations that proved ineffective, caused serious shutdowns, and required redesign or abandonment. GRA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N80-13994 Utah Univ., Salt Lake City.
HIGH RESOLUTION ASTRONOMICAL IMAGING THROUGH THE TURBULENT ATMOSPHERE Ph.D. Thesis
Richard Lee Frost 1979 131 p
Avail: Univ. Microfilms Order No. 7925038

The digital reconstruction of star images observed with large ground telescopes is developed. Solutions to the problems affecting the production of accurate and detailed reconstructions of stars are provided. A modification of the Knox-Thompson phase difference estimator is used to produce more accurate estimates. The performance of this estimator is evaluated by simulation at various signal-to-noise ratios. A nonlinear super resolution algorithm which appears to exhibit the best accuracy of any such algorithm proposed to date is described. An emperical evaluation was also conducted. These two techniques were used to restore images of the stars Betelgeuse and Capella. Significant findings are reported. Dissert. Abstr.

N80-13995 Maryland Univ., College Park.
EVALUATION AND APPLICATION OF AN INTENSIFIED CCD ARRAY PHOTOMETER FOR ASTRONOMICAL OBSERVATIONS Ph.D. Thesis
John Lamar Johnson 1979 178 p
Avail: Univ. Microfilms Order No. 7926530

The testing, of an imaging array photometer system to obtain

astronomical data is described. The system is an intensified charge coupled device with the ability to operate in the photon counting mode with an S20 photocathode response, driven by a field minicomputer and special purpose electronics including a high speed, high capacity circulating semiconductor memory. The array's leakage current, the noise and gain of the on-chip amplifier, the dynamic range, the signal to noise ratio, the system noise components, the quantum efficiency, the temperature effects on the noise and the leakage current, and the amount of damage due to photoelectron bombardment were measured. Observations on the 36 in and 48 in telescope at Goddard Space Flight Center in Maryland provided much of the component and system testing and some open cluster photometry. Dissert. Abtr.

N80-13996# Utah Univ., Salt Lake City.
HIGH RESOLUTION ASTRONOMICAL IMAGING THROUGH THE TURBULENT ATMOSPHERE
Richard Lee Frost, Craig K. Rushforth, and Brent S. Baxter Jul. 1979 131 p refs
(Grant AF-AFOSR-3212-77)
(AD-A073434; UTEC-79-081) Avail: NTIS HC A07/MF A01 CSCL 03/1

This research is principally concerned with the digital reconstruction of star images observed with large ground-based telescopes, although the techniques developed here will have application to a broad class of reconstruction problems. Since the work of Labeyrie, the difficulty in producing accurate and detailed reconstructions of stars has stemmed primarily from the extreme degradation of the phase spectrum caused by the atmospheric turbulence, and secondarily from the low-pass filter characteristic of the telescope itself. In this research, we describe solutions to both problems. Our phase estimator is based on the Knox-Thompson phase difference estimator, which we have extended and modified to produce more accurate estimates. The performance of this estimator is evaluated by simulation at various signal-to-noise ratios. We also describe a new non-linear super-resolution algorithm which appears to exhibit the best accuracy and convergence characteristics of any such algorithm proposed to date. It is also evaluated empirically. These two techniques were then used to restore images of the stars Betelgeuse and Capella. In the latter restoration resolution is realized well beyond the diffraction-limit of the telescope. Both reconstructions are consistent with known astrophysical facts, and both appear to be of high quality. GRA

N80-13997# California Univ., Berkeley. Lawrence Berkeley Lab.
FIGURE CONTROL FOR A SEGMENTED TELESCOPE MIRROR
Terry S. Mast and Jerry E. Nelson Mar. 1979 38 p refs
(Contract W-7405-eng-48)
(LBL-8621) Avail: NTIS HC A03/MF A01

The properties of a system to control the figure of a large telescope primary mirror that is composed of many individual segments are studied. The geometry considered, employing hexagonal mirrors, allows a simple and economical control system. The system is reliable and effective in continuously maintaining the figure to the precision required for optical astronomy. DOE

N80-13998# Academy of Sciences (USSR), Moscow. Inst. for Space Research.
IRON LINE EMISSION FROM THE ALFVEN SHELL IN X-RAY BINARIES
M. M. Basko 1979 49 p refs
(Pr-450) Avail: NTIS HC A03/MF A01

A model in which the iron line emission of 6 to 7 keV, discovered in the spectra of some X-ray binaries, is interpreted as a reradiation of the X-ray continuum in the gaseous shell at the Alfven surface. The radius of the Alfven shell is treated as a free parameter; the density in the shell is estimated and the temperature and the ionization equilibrium are determined by the interaction with the external X-ray flux. It is shown that the observed value of the line equivalent width can be explained if the radius of the Alfven shell is less than 0.1 times the radius of the generally accepted estimate for the Alfven radius. The problem of escape from the shell in the course of multiple resonance scattering is discussed in detail. Author (ESA)

N80-13999# European Southern Observatory, Munich (West Germany).
[REPORT ON EUROPEAN ASTRONOMICAL AND ASTROPHYSICAL ACTIVITIES] Annual Report, 1978
1978 55 p refs
Avail: NTIS HC A04/MF A01

A wide variety of research programs are reported. Studies encompassed contemporary astronomy and astrophysics, ranging over extragalactic phenomena, radio and X-ray sources, stars, and the structure of our own galaxy as well as interstellar matter. Apparatus utilized included a 3.6 m telescope equipped alternately with an image dissector scanner attached to a low dispersion spectrograph, mm and infrared detectors, and with Speckle interferometers. Design work underway on a cross-dispersed cassegrain echelle spectrograph is also reviewed. Author (ESA)

N80-14000# Academy of Sciences (USSR), Moscow. Inst. for Space Research.
COMPTON SHIFT OF X-RAYS IN PLASMA CLOUDS: TYPICAL RADIATION SPECTRA
R. A. Sunyaev and L. G. Titarchuk 1979 74 p refs
(Pr-441) Avail: NTIS HC A04/MF A01

Solutions of the photodiffusion problem in a cloud of completely ionized plasma with distributed photon sources are presented. The stationary Kompaneets equation is solved by the Whitteker function and the radiation spectra due to Compton scattering both in cold and hot electron plasma clouds are obtained. The distribution of photon over their escape time is found to be similar to the radiation curve for X-ray spectra. The obtained formulas allow for the determination of the plasma temperature in the region of maximum energy release in the Cyg-11 source. The effect of Compton shift in the X-ray iron spectral line profiles is shown to be strongly dependent on the photon source distribution over the plasma cloud. Author (ESA)

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N80-14001# California Univ., Livermore. Lawrence Livermore Lab.
STAR FORMATION
P. R. Woodward 27 Sep. 1978 101 p refs Presented at the Intern. School of Phys., Varenna, Italy, 26 Jun. - 7 Jul. 1978
(Contract W-7405-eng-48)
(UCRL-81758; CONF-7806119-1) Avail: NTIS HC A06/MF A01

Theoretical models of star formation are discussed beginning with the earliest stages and ending in the formations of rotating, self-gravitating disks or rings. A model of the implosion of very diffuse gas clouds is presented which relies upon a shock at the edge of a galactic spiral arm to drive the implosion. Models are presented for the formation of a second generation of massive stars in such a cloud once a first generation has formed. These models rely on the ionizing radiation from massive stars or on the supernova shocks produced when these stars explode. Calculations of the gravitational collapse of rotating clouds are discussed with special focus on the question of whether rotating disks or rings are the result of such a collapse. DOE

N80-13562# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany).
INSTABILITIES OF ACCRETION DISK: MAGNETOSPHERE INTERFACES
U. Anzer and G. Boerner *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 259-261 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13563# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany).
INTERACTION OF ACCRETION DISK AND ROTATING MAGNETIC FIELD OF NEUTRON STAR
U. Anzer and G. Boerner *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 263-264 refs (For primary document

see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13564# Bonn Univ. (West Germany). Inst. fuer Astrophysik.
SPINDOWN OF ROTATING MAGNETS
W. Kundt *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 265-267 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13565# California Univ., Berkeley. Dept. of Astronomy and Space Sciences.
THE MAGNETOSPHERES OF MAGNETIC A STARS AND OF PULSARS
J. Arons *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 271-279 refs (For primary document see N80-13529 04-42) (Grants NSF AST-77-23069; NSF AST-78-21070)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

N80-13566# Sussex Univ., Brighton (England).
THE BOUNDARY OF A PULSAR MAGNETOSPHERE: GAMMA-RAY PULSARS
N. J. Holloway *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 281-284 refs (For primary document see N80-13529 04-42)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N80-14002*# International Technology Associates, Inc., Long Beach, Calif.
PHOTOPOLARIMETRY OF SCATTERING SURFACES AND THEIR INTERPRETATION BY COMPUTER MODEL Final Report
Mile Wolff Nov. 1979 123 p refs
(Contract NASw-3201)
(NASA-CR-162514) Avail: NTIS HC A06/MF A01 CSCL 03B

Wolff's computer model of a rough planetary surface was simplified and revised. Close adherence to the actual geometry of a pitted surface and the inclusion of a function for diffuse light resulted in a quantitative model comparable to observations by planetary satellites and asteroids. A function is also derived to describe diffuse light emitted from a particulate surface. The function is in terms of the indices of refraction of the surface material, particle size, and viewing angles. Computer-generated plots describe the observable and theoretical light components for the Moon, Mercury, Mars and a spectrum of asteroids. Other plots describe the effects of changing surface material properties. Mathematical results are generated to relate the parameters of the negative polarization branch to the properties of surface pitting. An explanation is offered for the polarization of the rings of Saturn, and the average diameter of ring objects is found to be 30 to 40 centimeters. A.R.H.

N80-14003*# CosmoScience Associates, Inc., Stony Brook, N. Y.
SPACE ENVIRONMENT AND LUNAR SURFACE PROCESSES Final Report
George M. Comstock 25 Sep. 1979 64 p refs
(Contract NAS9-15582)
(NASA-CR-160363) Avail: NTIS HC A04/MF A01 CSCL 03B

The development of a general rock/soil model capable of simulating in a self consistent manner the mechanical and exposure history of an assemblage of solid and loose material from submicron to planetary size scales, applicable to lunar and other space exposed planetary surfaces is discussed. The model was incorporated into a computer code called MESS.2 (model for the evolution of space exposed surfaces). MESS.2, which represents a considerable increase in sophistication and scope over previous soil and rock surface models, is described. The capabilities of previous models for near surface soil and rock surfaces are compared with the rock/soil model, MESS.2. A.W.H.

N80-14004# Academy of Sciences (USSR), Moscow. Inst. for Space Research.
THE SPECTROPHOTOMETRIC EXPERIMENT ON BOARD THE VENERA-11, VENERA-12 PROBES: SOME RESULTS FROM THE ANALYSIS OF THE VENUS DAY-SKY SPECTRUM
V. I. Moroz, B. E. Moshkin, A. P. Ekonomov, N. F. Sanko, N. A. Parfentev, and Yu. M. Golovin 1979 16 p refs
(D-270) Avail: NTIS HC A02/MF A01

The day-sky spectra of Venus within the 4500 to 12,000 A wavelength range and the angular distribution of the scattered radiation brightness were recorded during the descent from 65 km to the Venus surface. The spectra show the absorption bands of Co2, water, and some absorption bands attributed to gaseous sulfur. While the abundance of water to CO2 is 20 ppm, the relative abundance of sulfur is the order of 0.01 ppm in the lowest part of the atmosphere. About 6% of the solar flux reaches the planet surface near the subsolar region. The lower boundary of the clouds is at about 47 to 48 km. Author (ESA)

N80-14005# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
MASS SPECTROMETER MEASUREMENTS OF THE VENUS LOWER ATMOSPHERE COMPOSITION
V. G. Istomin, K. V. Grechnev, and V. A. Kotchnev 1979 16 p refs
(D-271) Avail: NTIS HC A02/MF A01

Mass spectrometer measurements were carried out by the Venera 11 and Venera-12 missions in order to obtain data on atmospheric composition, abundance of minor components, and isotopic composition. The block diagram of the measuring devices is presented. The results show a considerable amount of N (4.5%) in addition to the main component CO2. The isotopic composition of C resembles that for Earth. The isotopic composition of Ar shows a strong anomaly: the abundance of secondary radiogenic isotope Ar-40 is nearly equal to the total abundance of primary isotopes Ar-36 and Ar-38. On the other hand the relative abundance of both primary isotopes corresponds to that of the Earth atmosphere. Author (ESA)

N80-14006# Academy of Sciences (USSR), Moscow. Inst. for Space Research.
ELECTRICAL DISCHARGES IN THE VENUS ATMOSPHERE
L. V. Ksanformaliti, N. M. Vasilchikov, O. F. Ganpantzerova, E. V. Petrova, A. P. Suvorov, G. F. Filippov, O. V. Yablonskaya, and L. V. Yabrova 1979 20 p refs
(D-272) Avail: NTIS HC A02/MF A01

The occurrence of electrical discharges and their characteristics were examined using data from the GROZA experiments during the Venera-11 and Venera-12 missions. A miniaturized sub-longwave spectra analyzer with a band range from 8 to 100 kHz was used. It is confirmed that electrical discharges occur in the cloud layer. Their energy is approximately the same as that of lightning on the Earth, but the mean frequency of discharge is much higher, reaching 30/sec. Author (ESA)

N80-14007# Academy of Sciences (USSR), Moscow. Inst. of Space Research.
GAS CHROMATOGRAPH ANALYSIS OF THE VENUS ATMOSPHERE CHEMICAL COMPOSITION ON BOARD THE VENERA-12 AUTOMATIC INTERPLANETARY STATION
B. G. Gelman, V. S. Zolotukhin, L. M. Mukhin, N. I. Lamanov, B. W. Levchuk, D. F. Nenarokov, B. P. Okhotnikov, V. A. Kotin, and A. N. Lipatov 1979 13 p refs
(D-275) Avail: NTIS HC A02/MF A01

The results of the gas chromotography experiment onboard the Venera-12 automatic interplanetary station are presented. Eight samples of the Venus atmosphere were taken beginning

at a height of 42 km, going down to the surface of the planet. Nitrogen concentration in the Venus atmosphere was observed to be 2.5% + or - 0.5% by volume, that of argon was 40 ppm + or - 20 by volume, that of CO was 28 ppm + or - 14 by volume, that of SO2 was 130 ppm + or - 60 by volume. Upper limits of oxygen and water content were estimated to be 20 ppm and 100 ppm by volume, respectively. Author (ESA)

N80-13558*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
JUPITER'S MAGNETOPAUSE
E. J. Smith *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 221-224 refs (For primary document see N80-13529 04-42)
(Contract NAS7-100)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 03B

N80-13559*# Rice Univ., Houston, Tex.
THE JOVIAN BOUNDARY LAYER AS FORMED BY MAGNETIC-ANOMALY EFFECTS
A. J. Dessler *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 225-226 refs (For primary document see N80-13529 04-42)
(Grant NGR-44-006-137)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 03B

N80-13560*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
EARTH AND JUPITER: COMPARISON OF MAGNETOPAUSE STRUCTURE
P. H. Reiff and C. W. Hill *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 227-228 refs (For primary document see N80-13529 04-42)
(Grants NGR-14-006-137; NSF ATM-78-21767)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 03B

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N80-14008# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
CONTRIBUTIONS TO THE FOURTH SOLAR WIND CONFERENCE
C. T. Dum, D. A. Gurnett (Iowa Univ.), E. Marsch, K.-H. Muelhaeuser, W. G. Pilipp, H. Rosenbauer (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), and R. Schwenn Apr. 1979 45 p refs Presented at 4th Solar Wind Conf., Burghausen, West Germany, 28 Aug. - 1 Sep. 1978 Submitted for publication
(MPI-PAE/Extraterr-154; ISSN-0340-8922) Avail: NTIS HC A03/MF A01

A series of six contributions to solar wind research are presented, mainly based on data from the Helios 1 and Helios 2 satellites. The subjects include on sound turbulence, alpha particles, proton velocity distribution, electron characteristics, boundary layers between fast and slow streams at the time of minimum solar activity, and radial gradients of plasma parameters in fast and slow streams at the time of minimum solar activity. For individual titles, see N80-14009 through N80-14014.
Author (ESA)

N80-14009*# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
ION SOUND TURBULENCE IN THE SOLAR WIND
C. T. Dum, E. Marsch, W. G. Pilipp, and D. A. Gurnett (Iowa Univ.) *In its* Contrib. to the 4th Solar Wind Conf. Apr. 1979 p 1-6 refs (For primary document see N80-14008 04-92)
(Contract NAS5-11279; Grant NGL-16-001-043)
Avail: NTIS HC A03/MF A01 CSCL 03B

A stability analysis for ion sound is carried out in order to contribute to clarifying the mechanism of some observed fluctuations, which directly uses detailed measured particle distributions rather than model distributions. Correlation with measured wave activity is satisfactory. Valuable information about the instability mechanism, transport processes, and the accuracy of measured distributions can be obtained by this method. An illustration from Helios 1 data is presented. Author (ESA)

N80-14010# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestriche Physik.
INITIAL RESULTS ON SOLAR WIND ALPHA PARTICLE DISTRIBUTIONS AS MEASURED BY HELIOS BETWEEN 0.3 AND 1 AU
E. Marsch, K.-H. Muelhaeuser, W. G. Pilipp, R. Schwenn, and H. Rosenbauer (Max Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) *In its* Contrib. to the 4th Solar Wind Conf. Apr. 1979 p 7-13 refs (For primary document see N80-14008 04-92)
(Contract BMFT-WRS-10/7)
Avail: NTIS HC A03/MF A01

Alpha particle parameters in the solar wind (0.3 to 1 AU) based on the first four (0th, 1st, 2d, 3d) moments of three dimensional velocity distributions derived from Helios spacecraft electrostatic plasma analyzer data are presented and discussed. The tendency for the alpha particle population to be faster than the protons in high speed streams increases with decreasing distance from the sun. In fast stream near 0.3 AU differential bulk velocities as high as 150 km/sec are observed.
Author (ESA)

N80-14011# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestriche Phys.
SOME CHARACTERISTICS OF PROTON VELOCITY DISTRIBUTIONS IN THE SOLAR WIND AS OBSERVED BY THE HELIOS SOLAR PROBES
E. Marsch, W. G. Pilipp, R. Schwenn, K.-H. Muelhaeuser, and H. Rosenbauer (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) *In its* Contrib. to the 4th Solar Wind Conf. Apr. 1979 p 14-20 refs (For primary document see N80-14008 04-92)
(Contract BMFT-WRS-10/7)
Avail: NTIS HC A03/MF A01

Three dimensional solar wind proton velocity distributions measured by the Helios spacecraft often show pronounced temperature anisotropies, field-aligned high energy shoulders, or double peaks. Part of these features of the proton distribution are well correlated with fluid parameters of the solar wind, mainly its speed and temperature. A phenomenological survey is given and the typical velocity, relative to the bulk velocity, of the protons carrying the heat flux is investigated. Whenever a second hump in the distribution can be detected, its velocity relative to the main peak is directed along the magnetic field and tends to be slightly higher on the average than the local Alfven speed.
Author (ESA)

N80-14012# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestriche Physik.
ELECTRON CHARACTERISTICS IN THE SOLAR WIND AS DEDUCED FROM HELIOS OBSERVATIONS
W. G. Pilipp, R. Schwenn, E. Marsch, K.-H. Muelhaeuser, and H. Rosenbauer (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germar ,) *In its* Contrib. to the 4th Solar Wind Conf. Apr. 1979 p 21-29 refs (For primary document see N80-14008 04-92)
Avail: NTIS HC A03/MF A01

Parameters characterizing the solar wind electron velocity distributions and their variation with different state of the solar wind are presented. Most electron spectra show a break-point energy between an isotropic component at low energies and an anisotropic as well as asymmetric component at larger energies, where the latter component has been termed as the 'strahl'. It is confirmed that the electron temperatures, the heat flux as well as the interplanetary electrostatic potential, usually tend to be higher in the slow solar wind than in high speed streams. However, marked decreases of these parameters are observed at the sector boundaries of the interplanetary magnetic field (IMP) inside of slow solar wind streams. Also the occurrence of the strahl tends to be correlated with the sector structure where the strahl is usually markedly pronounced within magnetic sectors but is weakened at the sector boundaries. It is suggested that these correlations with IMPF are caused by magnetic field line reconnection occurring at the sector boundaries. This interpretation

is supported further by simultaneous measurements onboard of Helios 1 and Helios 2. Author (ESA)

N80-14013# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestriche Physik.
TWO STATES OF THE SOLAR WIND AT THE TIME OF MINIMUM SOLAR ACTIVITY. PART 1: BOUNDARY LAYERS BETWEEN FAST AND SLOW STREAMS
R. Schwenn, K.-H. Muelhaeuser, and H. Rosenbauer (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) *In its* Contrib. to the 4th Solar Wind Conf. Apr. 1979 p 30-37 refs (For primary document see N80-14008 04-92)
(Contract BMFT-WRS-10/7)
Avail: NTIS HC A03/MF A01

During the time of the past minimum in solar activity, the Helios probes were relatively close to each other in solar longitude and latitude as well as in radial distance. A comparison of the solar wind parameters as observed from the two spacecraft reveals features of the boundary layers separating fast and slow streams. For instance, the boundary layers at the front edges of fast streams are significantly thinner (in angular extent) at 0.3 AU than at 1 AU. Tangential discontinuities in these stream interfaces, often observed at 1 AU, were not found inside 0.52 AU. The latitudinal boundary layers of fast streams can be thinner than 5 deg. Evidence for the occurrence of enhanced nonstationary phenomena along the interaction regions was also found.
Author (ESA)

N80-14014# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestriche Physik.
TWO STATES OF THE SOLAR WIND AT THE TIME OF MINIMUM SOLAR ACTIVITY. PART 2: RADIAL GRADIENTS OF PLASMA PARAMETERS IN FAST AND SLOW STREAMS
R. Schwenn, K.-H. Muelhaeuser, E. Marsch, and H. Rosenbauer (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) *In its* Contrib. to the 4th Solar Wind Conf. Apr. 1979 p 38-42 refs (For primary document see N80-14008 04-92)
(Contract BMFT-WRS-10/7)
Avail: NTIS HC A03/MF A01

Eight radial line-up constellations between Helios 1 and 2 occurred in the years 1976 and 1977. From the short periods of plasma line-ups when the plasma seen from the inner probe also encounteres the outer probe radial gradients of the plasma parameters could be obtained directly. Significant differences were found in the average gradients between the slow and the fast solar wind; in the slow plasma (up to 400 km/sec) the flow speed v sub p increases by 52 + or - 11 km/sec per AU and the proton temperature T sub p decreases as r to the (-1.21) power i.e. nearly adiabatically. In the fast plasma v sub p remains nearly constant and T sub p decreases as r to the (-0.69 + or - 0.08) power. Further differences are found in the general shape of the distribution functions and their changes with radial distance as well as in the properties of the alpha particle component.
Author (ESA)

N80-14015# California Univ., Berkeley. Lawrence Berkeley Lab.
MEASUREMENT AND ANALYSIS OF CIRCUMSOLAR RADIATION
D. F. Grether, D. Evans, A. Hunt, and M. Wahlig Apr. 1979 9 p refs
(Contract W-7405-eng-48)
(LBL-9214) Avail: NTIS HC A02/MF A01

The measurement of solar and circumsolar radiation for application to solar energy systems that employ concentrating collectors is discussed. The solar instruments which consist of scanning telescopes mounted on a precision solar tracker, and their locations are described. The data processing capabilities which aid in the analysis of the performance of each instrument system are discussed. Recent colored filter data are shown and a comparison of circumsolar radiation data obtained at Atlanta and Barstow is given. DOE

N80-13561*# California Univ., Los Angeles.
THE SOLAR WIND INTERACTION WITH VENUS
C. T. Russell, R. C. Elphic, and J. A. Slavin *In* ESA Magnetospheric Boundary Layers Aug. 1979 p 231-239 refs (For primary document see N80-13529 04-42)
(Contract NAS2-9491)
Avail: NTIS HC A18/MF A01; ESA, Paris FF 120 CSCL 03B

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N80-14016# California Univ., Berkeley.
DIRECT MEASUREMENTS OF THE SPECTRUM OF THE NEAR MILLIMETER COSMIC BACKGROUND
P. L. Richards Jun. 1979 24 p refs Presented at Universe at Large Redshifts Conf., Copenhagen, 25 Jun. 1979
(Contract W-7405-eng-48)
(LBL-9374; CONF-790697-1) Avail: NTIS HC A02/MF A01

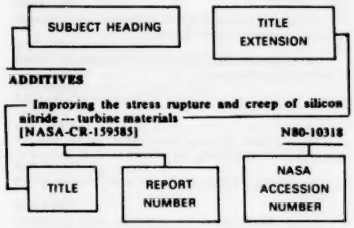
The spectrum of the cosmic background radiation which peaks at 6/cm and falls rapidly at higher frequencies is discussed. The experimental determination of this fact is described. The experimental difficulties which have plagued cosmic background measurements at and beyond the peak in the spectrum are described. A critical evaluation of the present status of the field is presented. DOE

99 GENERAL

No abstracts in this category.

SUBJECT INDEX

Typical Subject Index Listing



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A

A-10 AIRCRAFT
A-10 carriage loads test
[AD-A073442] N80-13034
Positional error analysis, A-10 aircraft on three-axis ground mount
[AD-A073600] N80-13336

ABLATIVE MATERIALS
Development and evaluation of an ablative closeout material for solid rocket booster thermal protection system
[NASA-TM-78241] N80-13258

ABSORPTION SPECTROSCOPY
Precision determination of atomic level energies by absorption spectrometry with synchrotron radiation
N80-13888

ACCELERATED LIFE TESTS
Method for accelerated aging under combined environmental stress conditions
[SAND-79-0930C] N80-13494

ACCELERATION [PHYSICS]
Review of earthquake vibratory ground motion intensity attenuation relationships
[SAN-1011/119] N80-13734

ACCELEROMETERS
Notes on the transient responses and errors of shock accelerometers with second-order filters
[RAE-TM-IT-179] N80-13435

ACCURACY
The gravity field of the earth
[RAE-TR-78142] N80-13737

ACETYLENE
Arc-coal acetylene process development program
[COO-4507-4] N80-13282

ACIDS
A study of ternary systems containing an acidic copolymer, a basic copolymer and a solvent
N80-13250

ACOUSTIC ATTENUATION
The acoustic characteristics of the RAE 1.5m wind tunnel --- modifications and test results
[RAE-TR-79002] N80-13062
Ultrasonic attenuation and velocity in AS/3501-6 graphite/epoxy fiber composite
[NASA-CR-3180] N80-13489

ACOUSTIC EMISSION
Deformation and failure information from composite materials via acoustic emission
[UCRL-81272] N80-13177
Elastodynamic diffraction and radiation problems
N80-13505
Pattern recognition methods for acoustic emission analysis
[NUREG-CR-0910] N80-13883

ACOUSTIC MEASUREMENTS
Advanced turbo-prop airplane interior noise reduction-source definition
[NASA-CR-159668] N80-13882

ACOUSTIC PROPAGATION
A survey of finite element-related techniques as applied to acoustic propagation in the ocean. Part 1: Finite element method and related techniques
N80-13300
A survey of finite element-related techniques as applied to acoustic propagation in the ocean. Part 2: Transparent boundary simulation techniques
N80-13304
Recent developments for the nonlinear distortion of non-dispersive acoustic waves. Part 1: Planar waves and the basic method
N80-13311
Acoustic techniques for measuring stress regions in materials
[EPRI-NP-1043] N80-13525

ACOUSTIC SCATTERING
Scattering of ultrasonic waves by periodically roughened surfaces --- detection of surface erosion
[CONF-790505-17] N80-13884
The scattering of sound by a region of fluid in solid body rotation at low Mach number
[RAE-TR-78100] N80-13886

ACOUSTIC VELOCITY
Ultrasonic attenuation and velocity in AS/3501-6 graphite/epoxy fiber composite
[NASA-CR-3180] N80-13489

ACTIVATED SLUDGE
Evaluation of surface aerator applications in the activated sludge process
N80-13987

ADAPTIVE FILTERS
A new weighting coefficient for adaptive state estimation
N80-13347
Least squares, adaptive-lattice algorithms
[AD-A073464] N80-13846

ADHESION
UHV-chamber: Theoretical background and facility development --- for dynamic contact experiments
N80-13086
Cell adhesion as influenced by substrate surface properties
N80-13252
Improved bondability to RTV silicone elastomer using rf-activated gas
[BDX-613-2157] N80-13260

ADHESIVE BONDING
Improved bondability to RTV silicone elastomer using rf-activated gas
[BDX-613-2157] N80-13260
Fatigue aging of adhesive bonds
[SAND-78-1842C] N80-13262
Investigation into the effect of plasma pretreatment on the adhesion of parylene to various substrates
[NASA-TM-79224] N80-13473

ADSORBENTS
Application of synthetic molecular sieve zeolites and silica gel toward the separation of sulfur dioxide from combustion gases
N80-13180

ADSORPTION
Optical reflectance studies of adsorption and reaction on platinum
N80-13183

ADSORPTIVITY
An adsorption study of hydrogen on iron and its relation to hydrogen embrittlement
N80-13209

AERATION
Evaluation of surface aerator applications in the activated sludge process
N80-13987

AERIAL PHOTOGRAPHY
Earth observations division Earth resources data analysis capabilities
[E80-10013] N80-13592
Interactive aids for cartography and photo interpretation --- aerial photography
[AD-A073452] N80-13603

AEROACOUSTICS
Experimental study of acoustic loads on an upper-surface-blown STOL airplane configuration --- Langley full-scale wind tunnel tests
[NASA-TP-1577] N80-13879
Assessment at full scale of exhaust nozzle to wing size on STOL-OTW acoustic characteristics
[NASA-TM-79279] N80-13881

AERODYNAMIC CHARACTERISTICS
Summary of low-speed longitudinal aerodynamics of two powered close-coupled wing-canard fighter configurations --- conducted in Langley C/STOL tunnel
[NASA-TP-1535] N80-12994
Transonic aerodynamic characteristics of a supersonic cruise aircraft research model with the engines suspended above the wing
[NASA-TM-80145] N80-12997
Aerodynamic preliminary analysis system. Part 1: Theory --- linearized potential theory
[NASA-CR-145284] N80-12998
Effects of fuselage forebody geometry on low-speed lateral-directional characteristics of twin-tail fighter model at high angles of attack
[NASA-TP-1592] N80-13002
Effects of relaxed static longitudinal stability on a single-stage-to-orbit vehicle design
[NASA-TP-1594] N80-13052

AERODYNAMIC CONFIGURATIONS
Aerodynamic design of an extended-range guided bomb
[LOG-C3719] N80-13023

AERODYNAMIC DRAG
Aerodynamic characteristics of wheelchairs --- Langley V/STOL wind tunnel tests for human factors engineering
[NASA-TM-80191] N80-12999
Drag devices for two-phase mass flow measurements
[CONF-790655-5] N80-13409

AERODYNAMIC HEATING
Aerothermal performance of radiatively and actively cooled panel at Mach 6.6
[NASA-TP-1595] N80-13402

AERODYNAMIC LOADS
Experimental study of acoustic loads on an upper-surface-blown STOL airplane configuration --- Langley full-scale wind tunnel tests
[NASA-TP-1577] N80-13879

AERODYNAMIC STALLING
Exploratory study of the effects of wing-leading-edge modifications on the stall/spin behavior of a light general aviation airplane
[NASA-TP-1589] N80-13026

AERODYNAMICS
Inclusion of unsteady aerodynamics in longitudinal parameter estimation from flight data --- use of vortices and mathematical models for parameterization from flight characteristics
[NASA-TP-1536] N80-12995

AEROELASTICITY
Some measurements of buffeting on an aeroelastic model of a slender wing aircraft
[RAE-TM-STRUCT-942] N80-13055

AEROSPACE ENVIRONMENTS
Space environment and lunar surface processes
[NASA-CR-160363] N80-14003

AEROSPACE MEDICINE
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 199
[NASA-SP-7011[199]] N80-13762
Analysis of metabolic energy utilization in the Skylab astronauts
[NASA-CR-160402] N80-13770
Skylab water balance error analysis
[NASA-CR-160403] N80-13771

AEROSPACE TECHNOLOGY TRANSFER
Modified aerospace reliability and quality assurance method for wind turbines
[NASA-TM-79284] N80-13490

AEROTHERMODYNAMICS
Aerothermal performance of radiatively and actively cooled panel at Mach 6.6
[NASA-TP-1595] N80-13402

AGING [MATERIALS]
Fatigue aging of adhesive bonds
[SAND-78-1842C] N80-13262
Method for accelerated aging under combined environmental stress conditions
[SAND-79-0930C] N80-13494

AGRICULTURE
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study --- Kansas
[E80-10012] N80-13591
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593

Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598

AGROCLIMATOLOGY
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589

AIR FLOW
Airflow effects on fires, part 2
[AD-A073486] N80-13196

AIR JETS
Evaluation of airjet distortion generator used to produce steady-state, total-pressure distortion at the inlet of a General Electric F101-GE-100 turbofan engine
[AD-A072743] N80-13049

AIR POLLUTION
Remote sensing applied to environmental pollution detection and management. A bibliography with abstracts
[NTIS/PS-79/0842/9] N80-13614

AIR QUALITY
Critique of the meteorological and air quality baseline monitoring program for the prototype oil shale leaseholds. Part A: Comments on the approach taken and recommendations for continuing program. Part B: Comments on the data acquisition and management
[DOE/EV-70031/4-PT-A/B] N80-13723
Guidelines for multimedia environmental monitoring of Department of Energy fossil energy RD and D facilities
[FE-2495-T13-VOL-2] N80-13724

AIR TRAFFIC
The Aircraft Reply and Interference Environment Simulator [ARIES]. Volume 3: Programmer's manual
[AD-A074424] N80-13017

AIR TRAFFIC CONTROL
The superposition of two-dimensional error fields and its influence on flight safety of air traffic
[ESA-TT-527-REV] N80-13022
Oversight: FAA R and D programs --- air traffic control and collision avoidance
[GPO-38-212] N80-13988

AIR TRANSPORTATION
Oversight: FAA R and D programs --- air traffic control and collision avoidance
[GPO-38-212] N80-13988

AIR WATER INTERACTIONS
A compilation of moored current meter and wind recorder data. Volume 18: JASIN 1978, Moorings 651-653
[AD-A073581] N80-13755

AIRBORNE EQUIPMENT
Development of an airborne gamma radiation system for snow surveys
[EGG-1183-1679] N80-13606

AIRCRAFT COMMUNICATION
The Aircraft Reply and Interference Environment Simulator [ARIES]. Volume 3: Programmer's manual
[AD-A074424] N80-13017

AIRCRAFT COMPARTMENTS
Evaluation of seating and restraint systems conducted during fiscal year 1978
[AD-A074881] N80-13014
Fire-resistant materials for aircraft passenger seat construction
[NASA-TM-78617] N80-13255

AIRCRAFT CONFIGURATIONS
Aerodynamic preliminary analysis system. Part 1: Theory --- linearized potential theory
[NASA-CR-145284] N80-12998
Some recent trends in aircraft flutter research --- analysis of flutter for aircraft design and use of oblique wings in aircraft configurations
N80-13307

AIRCRAFT DESIGN
Effects of fuselage forebody geometry on low-speed lateral-directional characteristics of twin-tail fighter model at high angles of attack
[NASA-TP-1592] N80-13002
Some recent trends in aircraft flutter research --- analysis of flutter for aircraft design and use of oblique wings in aircraft configurations
N80-13307

AIRCRAFT EQUIPMENT
Mechanical power system for aircraft intermittent utility functions --- systems engineering of using flywheels for aircraft control equipment
[AD-A073297] N80-13030
Anti-suffocation valve Bendix type no. 3267010-0101
[AD-A068927] N80-13772

AIRCRAFT FUELS
Temperature and flow measurements on near-freezing aviation fuels in a wing-tank model
[NASA-TM-79285] N80-13268

AIRCRAFT LANDING
An exploratory investigation of the STOL landing maneuver
[NASA-CR-3191] N80-12996
A computerized VSTOL/small platform landing dynamics investigation model
[AD-A073587] N80-13033
Parametric study of the Orbiter rollout using an approximate solution
[NASA-TM-80837] N80-13148
A new weighting coefficient for adaptive state estimation
N80-13347

AIRCRAFT MANEUVERS
An exploratory investigation of the STOL landing maneuver
[NASA-CR-3191] N80-12996
Beaver aircraft parameter identification: Technical preparations and preliminary results
[DFVLR-MITT-78-01] N80-13039

AIRCRAFT NOISE
Effect of noise spectra and a listening task upon passenger annoyance in a helicopter interior noise environment
[NASA-TP-1590] N80-13769
Effects of sound level fluctuations on annoyance caused by aircraft-flyover noise
[NASA-TP-1576] N80-13880
Advanced turbo-prop airplane interior noise reduction-source definition
[NASA-CR-159668] N80-13882

AIRCRAFT PARTS
Analytical investigation of the landing dynamics of a large airplane with a load-control system in the main landing gear
[NASA-TP-1555] N80-13025

AIRCRAFT PERFORMANCE
Jet transport performance in thunderstorm wind shear conditions
[NASA-CR-3207] N80-13742

AIRCRAFT PILOTS
A field of view simulator equipped for perspective transformation on a television raster
[FB-34] N80-13775

AIRCRAFT SAFETY
Jet transport performance in thunderstorm wind shear conditions
[NASA-CR-3207] N80-13742
Oversight: FAA R and D programs --- air traffic control and collision avoidance
[GPO-38-212] N80-13988

AIRCRAFT SPIN
Exploratory study of the effects of wing-leading-edge modifications on the stall/spin behavior of a light general aviation airplane
[NASA-TP-1589] N80-13026

AIRCRAFT STRUCTURES
Friction characteristic of steel skids equipped with skegs on a lakebed surface --- landing gear
[NASA-TM-81347] N80-13027
The use of strip theory in the dynamics of deformable aircraft
[RAE-TM-STRUCT-933] N80-13035
Formulation of the equations of motion of a deformable aircraft using Lagrange's equations in an arbitrary non-inertial frame of reference
[RAE-TM-STRUCT-941] N80-13036
A suggestion as to a general derivation of the equations of motion of a deformable aircraft for small perturbations which will be most generally acceptable
[RAE-TR-79011] N80-13038

AIRCRAFT TIRES
Wear, friction, and temperature characteristics of an aircraft tire undergoing braking and cornering
[NASA-TP-1569] N80-13013

AIRFRAMES
Digital load control applied to full-scale airframe fatigue tests
[AD-A073588] N80-13054
Manufacturing cost data collection and analysis for composite production hardware
[AD-A073507] N80-13174
Aerothermal performance of radiatively and actively cooled panel at Mach 6.6
[NASA-TP-1595] N80-13402

AIRSHIPS
In depth review of the 1979 AIAA Lighter-Than-Air Systems Technology Conference
[NASA-TM-81158] N80-12991

ALABAMA
Development of mining guidance and control systems
[NASA-TM-78226] N80-13601

ALASKA
Radar measurements of temperatures and ionic composition in the high-latitude ionosphere
N80-13728

ALCOHOLS
Status of alcohol fuels utilization technology for stationary gas turbines
[HCP/M2098-03] N80-13283

ALGAE
Biological transformation of light energy into methane using an anaerobic filter
N80-13267

ALGORITHMS
Dynamic behavior of shortest path routing algorithms for communication networks
[AD-A073487] N80-13338
Two-dimensional sequential algorithms for image restoration and enhancement
N80-13354
Expression continuity and the formal differentiation of algorithms
N80-13797
Computational experiments with zero-one programming algorithms and heuristics
N80-13800
Performance measurement and analysis of certain search algorithms
N80-13803
The design and evaluation of algorithms for parallel processing
N80-13805
Superlinearly globally convergent algorithms for nonlinear programming via sequential linear programs
N80-13808
Heuristic approaches to the decomposition of sparse matrices
N80-13810
Image segmentation by statistical edge detection and sequential edge growing
N80-13831
OPS MCC level B/C formulation requirements: Area targets and space volumes processor
[NASA-TM-80839] N80-13840
Least squares, adaptive-lattice algorithms
[AD-A073464] N80-13846
Algorithms for network flow problems with convex separable costs
N80-13871

ALLOYS
Solidification of highly undercooled liquid metals and alloys
N80-13118

ALOUETTE 1 SATELLITE
Studies on the thermosphere and ionosphere based on a detailed analysis of topside ionograms
[BMFT-FB-W-78-01] N80-13736

ALPHA JET AIRCRAFT
Industrial trial run of the AVA derivative balance on an Alphajet jet model in a 3 m windtunnel
[BMFT-FB-W-78-07] N80-13060

ALPHA PARTICLES
Initial results on solar wind alpha particle distributions as measured by Helios between 0.3 and 1 AU
N80-14010

ALTERNATING CURRENT
Harmonic current propagation on AC systems due to HUDC links
N80-13326

ALTERNATIVES
Development of alternate silicone potting compounds. Volume 5: Development of substitute no. 1 for Dow Corning's aerospace sealant DC93-122
[UCRL-52434-VOL-5] N80-13374

ALTIMETERS
A study of possible sea state information in the sample and hold gate statistics for the GEOS-3 satellite altimeter
[NASA-CR-156858] N80-13753

ALUMINUM
Cyclic creep behavior of pure aluminum and 7050 aluminum alloy
N80-13214
The fate of dissolved aluminum within the oceans
N80-13586

ALUMINUM ALLOYS
The preparation and stability of metallic emulsions in a microgravity environment: An experiment for the First Spacelab Payload [FSLP]
N80-13081
Preparatory studies for an experiment in directional solidification of immiscible Al-In alloys on board a rocket vehicle
N80-13100
Electronmicroscopic study of sand erosion processes in metals
[AD-A073497] N80-13220
Application of rapid solidification techniques to aluminum alloys --- mathematical model
[AD-A073443] N80-13223
An investigation of multi-axial creep characteristics of metals
[NEL-661] N80-13242
Industrial capability to chem-mill aluminum alloy 2219 in T-37 and T-87
[NASA-CR-161349] N80-13316
Co-sputtering of aluminum-silver alloy mirrors for solar reflectors
[RFP-2896] N80-13626
Interstitial-impurity trapping in Al-Fe and Al-Zn
[COO-1198-1267] N80-13975

ALUMINUM COMPOUNDS
Heterojunction materials and characteristics --- molecular structure study of gallium arsenides aluminum compounds heterojunction devices
[AD-A073792] N80-13365

ALUMINUM OXIDES
Development of tungsten coatings for the corrosion protection of alumina-based ceramics
[CONF-790442-13] N80-13261

Model studies of mixed-ion beta-aluminas
[CONF-790538-8] N80-13265
Inelastic electron tunneling spectroscopy of ring compounds on alumina
N80-13957
Thermal faceting behavior of single crystal aluminum oxide
N80-13960
Properties of single crystal beta-aluminas
[CONF-790538-9] N80-13977
Characterization of heat treatment induced changes in Li-NA beta-alumina single crystals
[CONF-790538-6] N80-13978

AMORPHOUS SEMICONDUCTORS
Thermal stability and decomposition kinetics of amorphous hydrogenated films
[CONF-790442-12] N80-13199

ANAEROBES
Biological transformation of light energy into methane using an anaerobic filter
N80-13267

ANALOG CIRCUITS
An investigation of the effects of analog and digital systems on signal fidelity
N80-13327

ANALOG SIMULATION
Evaluation of a simulation frame program for the EAI Pacer 600 hybrid-computer
[DFVLR-MITT-79-01] N80-13794

ANALOG TO DIGITAL CONVERTERS
Digital detection by digital signal processing techniques --- detection performance in presence of noise introduced by the analog to digital converter
N80-13331
Programmable Video Digitizing System [PVDS]. Functional description and preliminary software considerations
[AD-A073756] N80-13822

ANALYSIS [MATHEMATICS]
The shock and vibration digest, volume 11, number 7
[AD-A072745/3] N80-13310
The shock and vibration digest, volume 11, number 2
[AD-A065807] N80-13495

ANALYSIS OF VARIANCE
Sequential analysis of variance: Monte Carlo simulation, multivariate normal approximation, and robustness
[AD-A072629] N80-13818

ANEMOMETERS
Air flow measurements in a large irregularly shaped tunnel using anemometer and pitot-static tube traverse
[NEL-660] N80-13061

ANGLE OF ATTACK
Effects of fuselage forebody geometry on low-speed lateral-directional characteristics of twin-tail fighter model at high angles of attack
[NASA-TP-1592] N80-13002

ANGULAR MOMENTUM
Centrifugal instability of decelerating swirl-flow within finite and infinite circular cylinders
N80-13391

ANNEALING
Solar power satellite system definition study. Volume 4: Silicon solar cell annealing test, phase 1
[NASA-CR-160373] N80-13142

ANODES
Analysis of the anode boundary layer of a high pressure-high current arc
N80-13358

ANTARCTIC REGIONS
Dayside aurora and substorm current systems
N80-13555
The ocean tide and waves beneath the Ross Ice Shelf, Antarctica
N80-13751
Isopycnal transport by the Antarctic circumpolar current and the Antarctic influence at intermediate water densities
N80-13752

ANTENNA ARRAYS
A intrusive slotted cylinder antenna array for subsurface moisture profiling
N80-13323
A study of a reactively loaded finite planar rectangular waveguide antenna array
N80-13324
Design and fabrication on microstrip disk antenna arrays
N80-13328
Parameter estimation narrow-band processes with arrays
N80-13332
Equivalence principle as applied to conical arrays
[AD-A073384] N80-13335
Overlapped sub-array scanning antenna study
[AD-A070939] N80-13339

ANTENNA DESIGN
A study of a reactively loaded finite planar rectangular waveguide antenna array
N80-13324
Shuttle GPS R/PA configuration and specification study
[NASA-CR-160396] N80-13360

ANTENNA FEEDS
A study of a reactively loaded finite planar rectangular waveguide antenna array
N80-13324

ANTENNA RADIATION PATTERNS
Efficient numerical procedure for modeling antennas over lossy Earth
[UCRL-82121] N80-13341

ANTIPROTONS
Bunched-beam p-p[-] and p-p collisions
[BNL-26240] N80-13916

APPALACHIAN MOUNTAINS [NORTH AMERICA]
Devonian paleocurrents of the Applachian basin --- gas production
[METC/CR-79/22] N80-13735

APPLICATIONS PROGRAMS [COMPUTERS]
Application of finite element programs APES, ASAS and MARC to linear fracture mechanics
[LTR-ST-1118] N80-13511

APPROACH INDICATORS
Establishment criteria for Distance Measurement Equipment [DME] with instrument landing system and/or localizer approach
[AD-A069818] N80-13016

APPROXIMATION
Parametric study of the Orbiter rollout using an approximate solution
[NASA-TM-80837] N80-13148

AQUIFERS
Geopressure energy resource evaluation --- Texas and Louisiana
[ORNL/PPA-79/2] N80-13605
Large-scale annual-cycle thermal energy storage in aquifers
[CONF-790515-3] N80-13686

ARCHES
Dynamic snap-through of shallow arches and spherical caps
N80-13299

ARCHITECTURE [COMPUTERS]
Software for nonlinear filtering
[AD-A073051] N80-13817
Programmable Video Digitizing System [PVDS]. Functional description and preliminary software considerations
[AD-A073756] N80-13822

AREA NAVIGATION
OPS MCC level B/C formulation requirements: Area targets and space volumes processor
[NASA-TM-80839] N80-13840

ARGON ISOTOPES
Mass spectrometer measurements of the Venus lower atmosphere composition
[D-271] N80-14005

ARGON-OXYGEN ATMOSPHERES
Formation and coalescence of epitaxial crystallites in nickel electrodepositon in air and argon atmospheres
N80-13947

ARIANE LAUNCH VEHICLE
Concept study of a shuttle-satellite in consideration of European satellite developments and launcher systems for the 1980's
[BMFT-FB-W-78-25] N80-13129

ARIZONA
Energy system in the Far West: Impacts of the National Energy Act of 1978
[UCRL-52754] N80-13638

ARMATURES
Effects of metallurgical microstructure of armatures on compressed magnetic field generators
[SAND-79-0890C] N80-13375
The influence of ceramic permanent magnets on the armature of a small potential dc motor
[REPT-1631] N80-13386

ASCENT TRAJECTORIES
A numerical solution for rocket ascent trajectory
[AD-A073346] N80-13166

ASTRONOMICAL MODELS
Magnetospheric boundary layers --- conference proceedings, Albach, Austria, Jun. 1979
[ESA-SP-148] N80-13529

ASTRONOMICAL OBSERVATORIES
Report on European astronomical and astrophysical activities
N80-13999

ASTRONOMICAL TELESCOPES
High resolution astronomical imaging through the turbulent atmosphere
N80-13994
High resolution astronomical imaging through the turbulent atmosphere
[AD-A073434] N80-13996
Figure control for a segmented telescope mirror
[LBL-8621] N80-13997

ASTRONOMY
Evaluation and application of an intensified CCD array photometer for astronomical observations
N80-13995
Report on European astronomical and astrophysical activities
N80-13999

ASTROPHYSICS
High resolution astronomical imaging through the turbulent atmosphere
[AD-A073434] N80-13996
Report on European astronomical and astrophysical activities
N80-13999

ASYMPTOTIC SERIES
An asymptotic expansion approach to the inverse radiative transfer problem --- to infer concentration profiles of the atmosphere from measurements made onboard a satellite
[NASA-TP-1587] N80-13730
Asymptotic theory for process least squares estimators for diffusion processes
[AD-A073577] N80-13864

ATMOSPHERIC BOUNDARY LAYER
Ion composition in the Dayside Cusp: Injection of ionospheric ions into the high latitude boundary layer
N80-13553
Automated prediction of boundary layer winds and turbulence for the Savannah River Laboratory
[NOAA-TR-NWS-1007-1] N80-13746

ATMOSPHERIC CIRCULATION
Modified power law equations for vertical wind profiles
[NASA-TM-79275] N80-13623

ATMOSPHERIC COMPOSITION
An asymptotic expansion approach to the inverse radiative transfer problem --- to infer concentration profiles of the atmosphere from measurements made onboard a satellite
[NASA-TP-1587] N80-13730
The spectrophotometric experiment on board the Venera-11, Venera-12 probes: Some results from the analysis of the Venus day-sky spectrum
[D-270] N80-14004
Mass spectrometer measurements of the Venus lower atmosphere composition
[D-271] N80-14005
Gas chromatograph analysis of the Venus atmosphere chemical composition on board the Venera-12 automatic interplanetary station
[D-275] N80-14007

ATMOSPHERIC EFFECTS
Atmospheric correction of surface temperature measurements in a 10.5 to 12.5 micron channel from AVHRR/TIROS-N
N80-13739

ATMOSPHERIC HEATING
Numerical simulation of sudden stratospheric warnings
[NASA-CR-162505] N80-13744

ATMOSPHERIC MODELS
Influence of the interplanetary magnetic field on the position of the dayside magnetopause
N80-13570
Theory of the low attitude boundary layer
N80-13580
The influence of thermal fronts upon the solutions of an analytical model of a mid-latitude wave-cyclone
N80-13740
The importance of eddy momentum flux in the dynamics of a hurricane: A numerical approach
N80-13741
Numerical simulation of sudden stratospheric warnings
[NASA-CR-162505] N80-13744

ATMOSPHERIC TEMPERATURE
Radar measurements of temperatures and ionic composition in the high-latitude ionosphere
N80-13728
Warm/cold cloud processes
[NASA-CR-161336] N80-13743
Numerical simulation of sudden stratospheric warnings
[NASA-CR-162505] N80-13744

ATMOSPHERIC TIDES
Satellite contributions to tidal studies
[TUM-MITT-147] N80-13583

ATMOSPHERIC TURBULENCE
High resolution astronomical imaging through the turbulent atmosphere
N80-13994
High resolution astronomical imaging through the turbulent atmosphere
[AD-A073434] N80-13996

ATOMIC COLLISIONS
K-L and L-K vacancy sharing in ion-atom collisions
[UCRL-81947] N80-13894

ATOMIC ENERGY LEVELS
Precision determination of atomic level energies by absorption spectrometry with synchrotron radiation
N80-13888

ATOMIC STRUCTURE
Studies in structure and magnetic short range order. 1: Structure in amorphous germanium. 2: Magnetic interactions in gadolinum gallium garnet
N80-13956

ATOMIZING
Atomizing characteristics of swirl can combustor modules with swirl blast fuel injectors --- in terms of NOX emission rate
[NASA-TM-79297] N80-13047

ATS 3
Operational procedures for ground station operation: ATS-3 Hawaii-Ames satellite link experiment
[NASA-TM-81155] N80-13333

ATS 6
Multiple-satellite observations of large scale trapping boundary motions
N80-13549

ATTENUATION
Review of earthquake vibratory ground motion intensity attenuation relationships
[SAN-1011/119] N80-13734
AUDITORY PERCEPTION
Effect of noise spectra and a listening task upon passenger annoyance in a helicopter interior noise environment
[NASA-TP-1590] N80-13769
Auditory detection of bandpass-filtered impulses under various conditions of masking
N80-13877
AURORAL ELECTROJETS
Dayside aurora and substorm current systems
N80-13555
AURORAL IONIZATION
A theory for the asymmetry in the auroral ionization density profile for the generation of auroral infrasonic waves
N80-13729
AURORAL ZONES
Low-altitude signatures of the boundary layers
N80-13550
AUSTENITE
Loss of lattice rigidity in austenite
[AD-A073280] N80-13221
AUSTENITIC STAINLESS STEELS
Specificity hydrogen and stress corrosion cracking in austenitic stainless steel
N80-13208
Elevated temperature exposure has significant effects on the structure of austenitic stainless steel welds
[CONF-790736-1] N80-13232
AUSTRALIA
Studies on the thermosphere and ionosphere based on a detailed analysis of topside ionograms
[BMFT-FB-W-78-01] N80-13736
AUTOMATIC CONTROL
Experiment performance under zero-G using Small Self-Contained Payloads [SSCP] and other automatic equipment
N80-13122
A digital computer program for the dynamic interaction simulation of controls and structure [DISCOS]. Volume 4: Supplementary documentation
[NASA-TM-80546] N80-13150
Automated welding of nuclear piping systems --- gas tungsten arc welding in nuclear power plants
[CONF-790841-1] N80-13478
Figure control for a segmented telescope mirror
[LBL-8621] N80-13997
AUTOMATIC WEATHER STATIONS
Automated prediction of boundary layer winds and turbulence for the Savannah River Laboratory
[NOAA-TR-NWS-1007-1] N80-13746
AUTOMATION
Development of automated welding processes for field fabrication of thick-walled pressure vessels: Electron beam method
[DOE/ET-2606/4] N80-13476
AUTOMOBILE ENGINES
Assessment of the state of technology of automotive Stirling engines
[NASA-CR-159631] N80-13989
AUTOMOBILE FUELS
Physical properties of gasoline/alcohol automotive fuels
[CONF-790520-4] N80-13273
Driving cycle comparisons of energy economies and emissions from an alcohol and gasoline fueled vehicle
[CONF-790520-7] N80-13274
The 50,000 mile methanol/gasoline blend fleet study --- fuel efficiency and exhaust emissions
[CONF-790520-6] N80-13275
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels [riser cracking of coal]
[FE-2307-46] N80-13280
Liquid hydrogen as an automotive fuel
[LA-UR-79-621] N80-13297
AUTOMOBILES
Impact of flywheel-transmissions on automobile performance: A logical basis for evaluation
[UCRL-52758] N80-13480
The automobile driving simulator for anthropogenic research
[FB-41] N80-13779
AUTOREGRESSIVE PROCESSES
Autoregressive acquisition and interference-test coding for spread spectrum communications
N80-13329
Maximum likelihood estimation of the autoregressive coefficients and moving average covariances of vector autoregressive moving average models
[AD-A073788] N80-13845
AVALANCHE DIODES
Characteristics of TRAPATT amplifiers
N80-13349
AVIONICS
Flight test of navigation and guidance sensor errors measured on STOL approaches
[NASA-TM-81154] N80-13041
AXIAL STRAIN
Strain hardening and ductility of iron: Axisymmetric vs. plane strain elongation
[COO-4072-2] N80-13234
AXISYMMETRIC BODIES
Assessment of a method for predicting the drag and boundary layer development on a body of revolution at zero incidence
[AMTE[N]-R-78111] N80-13006
Large scale coherent structures in the wake of axisymmetric bodies --- wind tunnel investigation
[DFVLR-FB-78-28] N80-13007
AXISYMMETRIC FLOW
Hybrid random choice method with application to internal combustion engines 2 --- solving cylindrically or spherically symmetric flow equations
[LBL-9423] N80-13477

B

BACKGROUND NOISE
Direct measurements of the spectrum of the near millimeter cosmic background
[LBL-9374] N80-14016
BACKGROUND RADIATION
Direct measurements of the spectrum of the near millimeter cosmic background
[LBL-9374] N80-14016
BACKSCATTERING
An experimental and theoretical investigation of magnetic ordering in Yttrium Iron Garnet --- raman lasers backscattering
N80-13946
BANACH SPACE
Nonlinear hardy spaces and electrical power transfer
N80-13837
BAND STRUCTURE OF SOLIDS
A theoretical investigation of the electronic band structure and bulk properties of diamond
N80-13953
Transient phenomena in electron transport in semiconductors
[AD-A073009] N80-13966
BANDPASS FILTERS
Digital filtering techniques for use in minicomputers
[Y-2184] N80-13380
Auditory detection of bandpass-filtered impulses under various conditions of masking
N80-13877
BANDWIDTH
Parameter estimation narrow-band processes with arrays
N80-13332
BARIUM ZIRCONATES
Reactions of calcium orthosilicate and barium zirconate with oxides and sulfates of various elements
[NASA-TM-79272] N80-13256
BARLEY
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
BARREN LAND
The estimation of soil moisture content and actual evapotranspiration using thermal infra-red remote sensing --- Buckinghamshire, England
[E80-10021] N80-13599
Beauce TELLUS project --- France
[E80-10024] N80-13600
BASES [CHEMICAL]
A study of ternary systems containing an acidic copolymer, a basic copolymer and a solvent
N80-13250
BAYES THEOREM
Bayesian parameter and reliability estimation for a multivariate exponential distribution
N80-13862
Some contributions to gamma-minimax and empirical Bayes selection procedures
[AD-A073574] N80-13869
BEAMS [RADIATION]
Time dependent propagation of high-energy laser beams through the atmosphere, 4
[UCRL-52654] N80-13461
BEAMS [SUPPORTS]
Space fabrication demonstration system. Composite beam cap fabricator development, phase 1 and 2
[NASA-CR-161348] N80-13068
Experiment and prediction in the bending of a nickel beam at 200 deg C
[COO-2733-21] N80-13519
BEDS [PROCESS ENGINEERING]
Catalyst deactivition and fixed bed reactor modeling
N80-13181
Preparation of a coal conversion systems technical data book, project 61003
[FE-2286-32] N80-13281
Coal conversion in flash hydropyrolysis reactors
[BNL-26209] N80-13294
Cost analysis of packed beds for thermal energy storage
[CAES-11] N80-13687
BEECHCRAFT AIRCRAFT
Jet transport performance in thunderstorm wind shear conditions
[NASA-CR-3207] N80-13742
BELGIUM
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
BENDING FATIGUE
Analysis of surface cracks in finite plates under tension or bending loads
[NASA-TP-1578] N80-13512
BENDING MOMENTS
Experiment and prediction in the bending of a nickel beam at 200 deg C
[COO-2733-21] N80-13519
BIBLIOGRAPHIES
Remotely piloted vehicles. Citations from the International Aerospace Abstracts data base
[NTIS/PS-79/0875/9] N80-13040
Computer aided design of microcircuits. Citations from the NTIS data base
[NTIS/PS-79/0870/0] N80-13388
Computer aided design of microcircuits. Citations from the Engineering Index data base
[NTIS/PS-79/0871/8] N80-13389
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-79/0851/0] N80-13425
Numerical methods in fluid flow problems, volume 5. A bibliography with abstracts
[NTIS/PS-79/0852/8] N80-13426
Remote sensing applied to geology and mineralogy. A bibliography with abstracts
[NTIS/PS-79/0844/5] N80-13612
Remote sensing applied to geology. Citations from the International Aerospace Abstracts data base
[NTIS/PS-79/0822/1] N80-13613
Remote sensing applied to environmental pollution detection and management. A bibliography with abstracts
[NTIS/PS-79/0842/9] N80-13614
Remote sensing applied to urban and regional planning. A bibliography with abstracts
[NTIS/PS-79/0843/7] N80-13615
Thermal performance of buildings and building envelope systems: An annotated bibliography
[LBL-8925] N80-13680
Geothermal energy. Part 1: Exploration, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0814/8] N80-13715
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0815/5] N80-13716
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0816/3] N80-13717
Geothermal energy, volume 3. Citations from the Engineering Index data base
[NTIS/PS-79/0818/9] N80-13718
Geothermal energy. Part 3: Technology and general studies, volume 4. Citations from the NTIS data base
[NTIS/PS-79/0817/1] N80-13719
Geothermal energy, volume 4. Citations from the Engineering Index data base
[NTIS/PS-79/0819/7] N80-13720
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 199
[NASA-SP-7011[199]] N80-13762
BINARY ALLOYS
The preparation and stability of metallic emulsions in a microgravity environment: An experiment for the First Spacelab Payload [FSLP]
N80-13081
BINARY FLUIDS
Analysis of binary thermodynamic cycles for a moderately low-temperature geothermal resource
[TREE-1365] N80-13627
BINARY STARS
Iron line emission from the Alfven shell in X-ray binaries
[PR-450] N80-13998
BIOASSAY
Determining biological fine structure by differential absorption of soft X-ray
[BNL-26282] N80-13760
BIOLOGICAL EFFECTS
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 199
[NASA-SP-7011[199]] N80-13762
BIOMASS ENERGY PRODUCTION
Conversion of biomass from agriculture into useful products --- cellulose hydrolysis and butanediol fermentation
[COO-4298-1] N80-13278
Environmental analysis of synthetic liquid fuels --- shale oil, coal liquefaction, and biomass production of ethanol
[DOE/EV-0044] N80-13279
BIOMEDICAL DATA
Analysis of metabolic energy utilization in the Skylab astronauts
[NASA-CR-160402] N80-13770
Skylab water balance error analysis
[NASA-CR-160403] N80-13771
BIONICS
System parameters for erythropoiesis control model: Comparison of normal values in human and mouse model
[NASA-CR-160401] N80-13759

BISMUTH ALLOYS
The influence of microgravity on the structure of Bi-Zn immiscible alloys
N80-13098
BLAST DEFLECTORS
Reflected blast measurements at small scaled distances for M26E1 propellant
[AD-A073409] N80-13269
BLOWERS
An investigation of the efficiency of regenerative blowers and pumps
N80-13463
BODY MEASUREMENT [BIOLOGY]
Apparatus for measurement of tissue compliance
[BMFT-FB-W-78-05] N80-13768
BODY-WING AND TAIL CONFIGURATIONS
The equations of motion of an aircraft embracing its whole-body and deformational degrees of freedom
[RAE-TR-79010] N80-13037
BOILERS
Interim structural design standard for solar energy applications, phases 1 and 2 --- boiler and pressure vessel code
[SAND-79-8183] N80-13698
Technical support for open-cycle MHD program --- magnetohydrodynamic/boiler power systems analysis
[ANL/MHD-79-4] N80-13937
BOMBS [ORDNANCE]
Aerodynamic design of an extended-range guided bomb
[LOG-C3719] N80-13023
BONDING
Fracture toughness of graphite/epoxy composite laminates enhanced by the intermittent interlaminar bonding strength
N80-13169
BOOMS [EQUIPMENT]
Standardization of boom systems for sounding rocket experiments
[BMFT-FB-W-78-40] N80-13147
BOOSTER ROCKET ENGINES
Design, fabrication and delivery of a high pressure LOX-methane injector
[NASA-CR-161343] N80-13162
BOROSILICATE GLASS
Hertzian fracture of Pyrex glass and alpha quartz
N80-13510
BOSONS
Application of the boson polynomials of u[n] to physical problems
[LA-UR-78-2395] N80-13850
BOUNDARIES
Image segmentation by statistical edge detection and sequential edge growing
N80-13831
BOUNDARY LAYER CONTROL
Investigation of blown boundary layers with an improved wall jet stream
N80-13400
BOUNDARY LAYER EQUATIONS
Analysis of the anode boundary layer of a high pressure-high current arc
N80-13358
BOUNDARY LAYER FLOW
Effects of wall waviness and nonlinear wave interactions on the stability of boundary-layer flows
N80-12992
Marangoni boundary layers
N80-13114
A review of research into oscillating boundary layers
[AAAF-NT-79-04] N80-13423
Plasma structure of the magnetopause and boundary layer
N80-13532
The formation and properties of boundary layers downstream from neutral lines in an open magnetosphere
N80-13572
BOUNDARY LAYER PLASMAS
Magnetospheric boundary layers --- conference proceedings, Albach, Austria, Jun. 1979
[ESA-SP-148] N80-13529
First observations of a heated plasma component in the plasma mantle
N80-13538
Critical level behavior of ion-cyclotron waves at magnetospheric boundary layers
N80-13542
Particle boundary structures at the magnetopause and the plasma sheet
N80-13547
Low-altitude signatures of the boundary layers
N80-13550
Comments on the low-altitude optical signatures of magnetospheric boundary layers
N80-13556
Low frequency waves and irregularities in the low altitude boundary layer
N80-13557
The Jovian boundary layer as formed by magnetic-anomaly effects
N80-13559
The boundary of a pulsar magnetosphere: Gamma-ray pulsars
N80-13566
Kinetic theory of the boundary layer between a flowing isotropic plasma and a magnetic field
N80-13567
A microscopic description of interpenetrated plasma regions
N80-13568
Magnetopause Kelvin-Helmholtz instability
N80-13575
Interaction between the magnetospheric boundary layers and the ionosphere
N80-13579
Theory of the low attitude boundary layer
N80-13580
Electromagnetic structure of the magnetopause and boundary layer
N80-13581
BOUNDARY LAYER SEPARATION
Investigation of flow characteristics over missile bodies at supersonic speeds
[NASA-TP-1579] N80-13001
Investigation of blown boundary layers with an improved wall jet system --- to prevent turbulent boundary layer separation
[NASA-CR-162512] N80-13004
Unsteady flow characteristics in the near wake of a two dimensional obstacle
[AAAF-NT-79-08] N80-13008
Investigation of blown boundary layers with an improved wall jet stream
N80-13400
First results of a study on turbulent boundary layers in an oscillating flow with a mean adverse pressure gradient
[AAAF-NT-79-05] N80-13424
BOUNDARY LAYER STABILITY
Effects of wall waviness and nonlinear wave interactions on the stability of boundary-layer flows
N80-12992
BOUNDARY LAYER TRANSITION
Assessment of a method for predicting the drag and boundary layer development on a body of revolution at zero incidence
[AMTE[N]-R-78111] N80-13006
BOUNDARY LAYERS
Marangoni boundary layers
N80-13114
Internal combustion engine sampling probes: A study of sample-gas origins, flow disturbances and quench-layer bias
N80-13468
Two states of the solar wind at the time of minimum solar activity. Part 1: Boundary layers between fast and slow streams
N80-14013
BOUNDARY VALUE PROBLEMS
Thermodynamics and dynamics of line phases
N80-13105
Improved boundary-integral equation method for time-dependent inelastic deformation in metals
[COO-2733-20] N80-13230
Two-dimensional jet boundary interaction for submerged thermal discharges
N80-13390
The performance estimation of an axial-flow compressor stage using theoretically derived blade element characteristics with experimental comparison
N80-13466
Lecture notes on ordinary differential equations software, user's guide for ODE, RKF45, GEAR and EPISODE
[ORNL/CSD/TM-64] N80-13849
The construction of spacetimes from initial data
N80-13870
Solution of the initial value problem and energy redistribution for electron and Alfven waves in inhomogeneous plasmas
[REPT-78-115] N80-13945
BRAKES [FOR ARRESTING MOTION]
Transient thermal effects in disc brakes
N80-13465
BRAKING
Wear, friction, and temperature characteristics of an aircraft tire undergoing braking and cornering
[NASA-TP-1569] N80-13013
BRAYTON CYCLE
Conceptual designs for two reject heat systems for a Brayton closed-cycle converter
[LA-7821-MS] N80-13677
Novel ceramic receiver for solar Brayton systems
[COO-4878-3] N80-13694
BRAZIL
A report on field work in the city of Paragominas [PA]
[E80-10001] N80-13587
BRAZING
Brazing under microgravity: TEXUS 2 experiment
N80-13082
BREEDER REACTORS
Experimental study of hydrogen jet ignition and jet extinguishment --- breeder reactor safety
[HEDL-TME-78-80] N80-13198
BRIGHTNESS
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study --- Kansas
[E80-10012] N80-13591
BRIGHTNESS TEMPERATURE
Beauce TELLUS project --- France
[E80-10024] N80-13600
BRINES
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0815/5] N80-13716
BROADBAND
The effect of analysis bandwidth on the accuracy of measurements and predictions of single degree of freedom system behavior
[AMTE[N]-TM-79401] N80-13526
Theoretical analysis of multi-cell, high efficiency broad spectral sensitivity solar cells
N80-13617
Nonlinear hardy spaces and electrical power transfer
N80-13837
BROADBAND AMPLIFIERS
Characteristics of TRAPATT amplifiers
N80-13349
BROMIDES
Experiment MORAVA on board Salyut 6 --- on the crystallization of eutectic compounds
N80-13096
BROMINE
Spectral emission of nuclear excited XeBr*
N80-13443
Assessment of technical and economic feasibility of zinc/bromine batteries for utility load leveling
[EPRI-EM-1059] N80-13659
BRONCHI
Modeling studies of the pressure-flow relationship of the central airways
N80-13763
BRONZES
Domain and surface structures of sodium tungsten bronzes, Na/sub x/WO3 [0.4 x 1]
[ANL-78-63] N80-13237
Superconducting properties of [Nb,Ta]3Sn wires fabricated by the bronze process
[BNL-26391] N80-13383
BRUSHES [ELECTRICAL CONTACTS]
Design and testing of high performance brushes
[AD-A073593] N80-13367
BUBBLES
Migration of gas bubbles under various force fields in a microgravitational environment
N80-13113
Marangoni bubble motion in zero gravity --- Lewis zero gravity drop tower
[NASA-TM-79250] N80-13403
BUCKLING
Dynamic plastic buckling of shells: A reconsideration of the Vaughan-Florence analysis
[CONF-790802-1] N80-13518
BUFFETING
Some measurements of buffeting on an aeroelastic model of a slender wing aircraft
[RAE-TM-STRUCT-942] N80-13055
BUILDINGS
Thermal performance of buildings and building envelope systems: An annotated bibliography
[LBL-8925] N80-13680
BURNERS
Experimental and predicted performance for the combustion of a low heating value gas in a swirl burner --- finite difference analysis
N80-13467
BURSTS
Energetic electron bursts in the magnetopause electron layer and in interplanetary space
N80-13544
BUTANES
Commercialization task force for high Btu gasification
[TID-28849] N80-13286

C

CABLES [ROPES]
The shock and vibration digest, volume 11, number 6
[AD-A070464/3] N80-13499
Current methods for analyzing dynamic cable response --- vibration
N80-13500
CALCIUM COMPOUNDS
Design and development of a 30 watt solid polymer electrolyte fuel cell power source fueled with calcium hydride
[AD-A071157] N80-13625
CALCIUM SILICATES
Reactions of calcium orthosilicate and barium zirconate with oxides and sulfates of various elements
[NASA-TM-79272] N80-13256
CALCULUS OF VARIATIONS
Recent applications of variational techniques in statistics
[AD-A073511] N80-13868
CALENDARS
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590

CALIBRATING
Report of Optical Radiometric Instruments and Calibration Panel --- spaceborne instrumentation technology
N80-13154

CALIFORNIA
Energy system in the Far West: Impacts of the National Energy Act of 1978
[UCRL-52754] N80-13638

CALORIMETERS
Comparison of centrifuge and freezing calorimeter methods for measuring free water in snow
[NASA-CR-162504] N80-13319

CANARD CONFIGURATIONS
Summary of low-speed longitudinal aerodynamics of two powered close-coupled wing-canard fighter configurations --- conducted in Langley C/STOL tunnel
[NASA-TP-1535] N80-12994

CAPACITORS
Ceramic capacitors: A comparative investigation of the quality and stability of 23 manufactures and types, including disc, plate and multilayer capacitors
[ECR-87] N80-13387

CAPILLARY FLOW
Mathematical modeling of the breakup of laminar capillary jets
N80-13399

CARBON
X-ray measurement of carbon-caused atomic displacements in Fe-Ni-C martensite
N80-13217
Combustion of solid carbon rods in zero and normal gravity
[NASA-TM-79303] N80-13404
Nuclear pumping mechanisms in atomic carbon and in excimers
N80-13445
Carbon particulate measurements in a diesel engine --- particle size distribution
[SAND-79-8210] N80-13725

CARBON DIOXIDE
The rate of dissociation of CO2 on liquid iron and nickel
N80-13215

CARBON DIOXIDE CONCENTRATION
Carbon dioxide concentration and temperature in flames measured by Raman spectroscopy
[SAND-79-8612] N80-13204

CARBON DIOXIDE LASERS
Nuclear-pumped CO2 laser
N80-13440
Nuclear excitation of CO2 and CO
N80-13447
Kinetics of a CO2 nuclear pumped laser
N80-13449
Multiple-pass carbon dioxide laser heating of a theta-pinch plasma
N80-13936

CARBON MONOXIDE
Effect of pressure on structure and NO sub X formation in CO-air diffusion flames
[NASA-TP-1448] N80-13191
Infrared absorption of spectroscopy of carbon monoxide on nickel films: A low temperature thermal detection technique
[LBL-8482] N80-13239
An analytical study of nitrogen oxides and carbon monoxide emissions in hydrocarbon combustion with added nitrogen, preliminary results
[NASA-TM-79296] N80-13721

CARBON MONOXIDE LASERS
Nuclear excitation of CO2 and CO
N80-13447

CARBON STEELS
Alloying and heat treatment optimization of Fe/Cr/C steels for improved mechanical properties
[LBL-9260] N80-13236

CARRIAGES
A-10 carriage loads test
[AD-A073442] N80-13034

CAST ALLOYS
Unidirectional solidification of eutectic iron-carbon alloys and the segregation of sulfur
N80-13085
Section size effects on toughness of various cast steels
N80-13210

CATALYSIS
Advanced catalytic combustors for low pollutant emissions, phase 1
[NASA-CR-159535] N80-13048

CATALYSTS
Catalyst deactivition and fixed bed reactor modeling
N80-13181
Gas generator research and development: BI-GAS process
[FE-1207-62] N80-13288

CATALYTIC ACTIVITY
Catalyst development for coal liquefaction
[EPRI-AF-1084] N80-13292

CATENARIES
Current methods for analyzing dynamic cable response --- vibration
N80-13500

CATIONS
Model studies of mixed-ion beta-aluminas
[CONF-790538-8] N80-13265

CELESTIAL REFERENCE SYSTEMS
Investigations on the hierarchy of reference frames in geodesy and geodynamics
[NASA-CR-162499] N80-13731

CELLS [BIOLOGY]
Cell adhesion as influenced by substrate surface properties
N80-13252

CELLULOSE
Conversion of biomass from agriculture into useful products --- cellulose hydrolysis and butanediol fermentation
[COO-4298-1] N80-13278

CELLULOSE NITRATE
Convective ignition of nitrocellulose based propellants in unsteady flow fields
[AD-A073546] N80-13271

CENSORED DATA [MATHEMATICS]
Extreme sample censoring problems with multivariate data, 2
[AD-A073563] N80-13848

CENTRAL PROCESSING UNITS
Processor and file allocation in distributed data base systems
N80-13787
Utility language for the NMFECC
[CONF-781053-4] N80-13827

CENTRIFUGING
Investigation of the structure of Te-Se solid solutions obtained under different gravity conditions on board the Salyut 6 station, in a centrifuge
N80-13074
Comparison of centrifuge and freezing calorimeter methods for measuring free water in snow
[NASA-CR-162504] N80-13319

CERAMICS
Fracture studies in ceramics with particular emphasis on beta'-alumina
N80-13243
Reactions of calcium orthosilicate and barium zirconate with oxides and sulfates of various elements
[NASA-TM-79272] N80-13256
Lead zirconate titanate [LZT] ceramics
[AD-A073564] N80-13259
Development of tungsten coatings for the corrosion protection of alumina-based ceramics
[CONF-790442-13] N80-13261
Development of high temperature resistant, incorrodible, non-metallic ceramic materials: The use of silicon nitride for heat exchangers in gas turbine applications
[BMFT-FB-T-78-51] N80-13266
The influence of ceramic permanent magnets on the armature of a small potential dc motor
[REPT-1631] N80-13386
Ceramic capacitors: A comparative investigation of the quality and stability of 23 manufactures and types, including disc, plate and multilayer capacitors
[ECR-87] N80-13387
Development of porous sintered-ceramic separators for application in a Li-Al/LiCl-KCl/FeS battery
[CONF-790526-2] N80-13683
Novel ceramic receiver for solar Brayton systems
[COO-4878-3] N80-13694

CERENKOV COUNTERS
Energy and spectrum measurements of high energy electrons beams using a Cerenkov detector
N80-13898

CHANNELS [DATA TRANSMISSION]
Spacelab interface development test, volume 1, sections 1-6
[NASA-CR-160411] N80-13149
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160404] N80-13334
Optical digital techniques
[NASA-CR-160392] N80-13922

CHAPMAN-FERRARO PROBLEM
Solution of the Chapman-Ferraro problem within two dimensions
N80-13569

CHARGE CARRIERS
Charge carrier mobility and transmission across the liquid-vapor interface for the dielectric liquid hydrogen
N80-13899

CHARGE COUPLED DEVICES
Evaluation and application of an intensified CCD array photometer for astronomical observations
N80-13995

CHARGE DISTRIBUTION
The nuclear and ionic charge distribution particle experiments on the ISEE-1 and ISEE-C spacecraft
[BMFT-FB-W-78-38] N80-13132

CHARGE FLOW DEVICES
A study of the dissipative mechanism in the flow of superfluid helium-4 using charged vortex rings
N80-13314

CHARGE TRANSFER
Nonlinear hardy spaces and electrical power transfer
N80-13837
Charge carrier mobility and transmission across the liquid-vapor interface for the dielectric liquid hydrogen
N80-13899

CHEMICAL ANALYSIS
Laboratory design for modern analytical instruments
[CONF-790702-1] N80-13434
Electron microprobe analysis of tantalum-nitride thin films
[BDX-613-1198-REV] N80-13967

CHEMICAL BONDS
The parachor and the P yields O bond
[AD-A073410] N80-13168

CHEMICAL CLEANING
Plasma cleaning end-of-process detection --- using optical emission techniques
[BDX-613-2229-REV] N80-13384

CHEMICAL COMPOSITION
Elevated temperature exposure has significant effects on the structure of austenitic stainless steel welds
[CONF-790736-1] N80-13232
The fate of dissolved aluminum within the oceans
N80-13586

CHEMICAL ENERGY
Studies of ionization processes --- laser applications for study of chemical energy and reaction kinetics in molecular ions
[AD-A073823] N80-13195

CHEMICAL ENGINEERING
Optimal design of flexible chemical processes
N80-13187

CHEMICAL EQUILIBRIUM
Computational of physical and chemical equilibria
N80-13184

CHEMICAL LASERS
A purely chemical HBr laser
[AD-A060841] N80-13454

CHEMICAL MACHINING
Industrial capability to chem-mill aluminum alloy 2219 in T-37 and T-87
[NASA-CR-161349] N80-13316

CHEMICAL PROPERTIES
Domain and surface structures of sodium tungsten bronzes, Na/sub x/WO3 [0.4 x 1]
[ANL-78-63] N80-13237
Evaluation of polar and non-polar plastics compounded with thermomechanical wood fibers
N80-13247

CHEMICAL REACTIONS
Space experiments on chemical pattern formation
N80-13109
Several aspects of dynamic behavior in nonlinear mathematical models of chemical reaction and diffusion
N80-13186
Optimal design of flexible chemical processes
N80-13187
Development of laboratory apparatus dedicated to the study of hydride-dehydride reactions
[SAND-78-1803] N80-13201
Reactions of calcium orthosilicate and barium zirconate with oxides and sulfates of various elements
[NASA-TM-79272] N80-13256
Synthesis of improved polyester resins
[NASA-CR-159665] N80-13257

CHEMICAL REACTORS
Coal liquefaction short residence time process research
[SAND-79-1400] N80-13272

CHEMISORPTION
An adsorption study of hydrogen on iron and its relation to hydrogen embrittlement
N80-13209

CHIPS [MEMORY DEVICES]
Latch-up and radiation integrated circuit--LURIC: A chip for CMOS latch-up investigation
[SAND-78-1540] N80-13369

CHLORINE
Hydrogen-halogen energy storage system
[BNL-50924] N80-13632

CHLOROPHYLLS
The water splitting light reaction of chlorophyll a dihydrate. Visible light solar energy conversion after the primary reaction in plant photosynthesis
N80-13188

CHROMIUM
Chromium doped semi-insulating gallium arsenide grown by liquid phase epitaxy
N80-13949

CHROMIUM STEELS
Alloying and heat treatment optimization of Fe/Cr/C steels for improved mechanical properties
[LBL-9260] N80-13236

CIRCUIT DIAGRAMS
Rom-based sequential circuits: An alternative approach to conventional logic design
[SAND-78-2333] N80-13370

CIRCUIT RELIABILITY
Reliability test and evaluation of MIL-M-38510 linear microcircuits
[AD-A073455] N80-13363

CIRCUITS
Computer aided design of microcircuits. Citations from the Engineering Index data base
[NTIS/PS-79/0871/8] N80-13389

CIRCULAR CYLINDERS
Centrifugal instability of decelerating swirl-flow within finite and infinite circular cylinders
N80-13391

CIRCUMSOLAR RADIATION
Measurement and analysis of circumsolar radiation
[LBL-9214] N80-14015

CITIES
A technical and economic evaluation of the project in Baltimore, Maryland, volume 2 --- waste processing plant
[PB-297871/6] N80-13991
A technical and economic evaluation of the project in Baltimore, Maryland, Volume 3 --- waste processing plant
[PB-297872/4] N80-13992
A technical and economic evaluation of the project in Baltimore, Maryland, volume 4 --- waste processing plant
[PB-297873/2] N80-13993
CIVIL AVIATION
Oversight: FAA R and D programs --- air traffic control and collision avoidance
[GPO-38-212] N80-13988
CLASSIFICATIONS
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study --- Kansas
[E80-10012] N80-13591
CLEAN ROOMS
Controlling the clean room atmosphere
[GEPP-OP-405] N80-13138
CLEANING
Evaluation of cleaners for photovoltaic modules exposed in an outdoor environment
[NASA-TM-79248] N80-13317
Investigation into the effect of plasma pretreatment on the adhesion of parylene to various substrates
[NASA-TM-79224] N80-13473
CLINICAL MEDICINE
The effects of context on the structure of pain
N80-13761
CLOSED ECOLOGICAL SYSTEMS
A preliminary research plan for development of a photosynthetic link in a closed ecological life support system
[NASA-CR-160399] N80-13758
CLOUD CHAMBERS
Warm/cold cloud processes
[NASA-CR-161336] N80-13743
CLOUD PHYSICS
Warm/cold cloud processes
[NASA-CR-161336] N80-13743
CMOS
Latch-up and radiation integrated circuit--LURIC: A test chip for CMOS latch-up investigation
[SAND-78-1540] N80-13369
Latch-up control in CMOS integrated circuits
[SAND-79-0646C] N80-13382
COAL
Arc-coal acetylene process development program
[COO-4507-4] N80-13282
Coalification reactions under pressure
[MLM-2556[TR]] N80-13284
Methane recovery from coalbeds project. Technology test projects: Evaluation of candidate projects
[METC-8089-T4] N80-13290
Development of mining guidance and control systems
[NASA-TM-78226] N80-13601
Fossil energy program, 1. Mining research and development: Coal preparation and analysis
[IS-4703] N80-13702
COAL GASIFICATION
Preparation of a coal conversion systems technical data book, project 61003
[FE-2286-32] N80-13281
Gas generator research and development: BI-GAS process
[FE-1207-62] N80-13288
Underground coal conversion. Program description
[DOE/ET-0100] N80-13293
Coal conversion in flash hydropyrolysis reactors
[BNL-26209] N80-13294
Review of supporting research at Oak Ridge National Laboratory for underground coal conversion
[CONF-790630-9] N80-13295
COAL LIQUEFACTION
Coal liquefaction short residence time process research
[SAND-79-1400] N80-13272
Environmental analysis of synthetic liquid fuels --- shale oil, coal liquefaction, and biomass production of ethanol
[DOE/EV-0044] N80-13279
Preparation of a coal conversion systems technical data book, project 61003
[FE-2286-32] N80-13281
Commercialization strategy report for coal liquefaction
[TID-28846] N80-13285
Gasification of residual materials from coal liquefaction
[FE-2247-22] N80-13289
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-30] N80-13291
Catalyst development for coal liquefaction
[EPRI-AF-1084] N80-13292
Coal conversion in flash hydropyrolysis reactors
[BNL-26209] N80-13294
COAL UTILIZATION
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels [riser cracking of coal]
[FE-2307-46] N80-13280
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-33] N80-13287
Status of development, energy and economics aspects of alternative technologies --- energy policy and technology with respect to coal utilization
[CONF-790371-1] N80-13689
COALESCING
Formation and coalescence of epitaxial crystallites in nickel electrodepositon in air and argon atmospheres
N80-13947
COASTAL ECOLOGY
Wetland values concepts and methods wetlands evaluation
[AD-A069088] N80-13602
COASTAL WATER
Strategies for the surveillance of coastal waters of the Federal Republic of Germany
[BMFT-FB-M-77-11] N80-13726
COASTS
National energy policy and state coastal programs: A critique of current efforts to balance environmental protection and energy production along the coast
[SAN-0034/263-1] N80-13643
COEFFICIENT OF FRICTION
Friction characteristic of steel skids equipped with skegs on a lakebed surface --- landing gear
[NASA-TM-81347] N80-13027
Studies in molecular dynamics of the friction coefficient and the Lorentz gas
[UCRL-52815] N80-13895
COGNITION
An exploratory study of the cognitive structures underlying the comprehension of software design problems
[AD-A073727] N80-13821
COHERENT RADIATION
Nuclear-Pumped Lasers --- efficient conversion of energy liberated in nuclear reactions to coherent radiation
[NASA-CP-2107] N80-13438
COLLISION AVOIDANCE
The superposition of two-dimensional error fields and its influence on flight safety of air traffic
[ESA-TT-527-REV] N80-13022
Oversight: FAA R and D programs --- air traffic control and collision avoidance
[GPO-38-212] N80-13988
COLLISIONAL PLASMAS
Kinetic theory of ballooning instabilities --- kinetic theory of magnetohydrodynamic stability of collisional plasmas
N80-13932
COLOR
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study --- Kansas
[E80-10012] N80-13591
COLOR TELEVISION
The use of a microprocessor for the manipulation and representation of large amounts of data on a color television monitor
[FB-39] N80-13795
COLORADO
Digital processing of LANDSAT MSS and topographic data to improve capabilities for computerized mapping of forest cover types --- Colorado and Washington
[E80-10009] N80-13588
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
COLORADO RIVER [NORTH AMERICA]
Solar thermal electric plants in hydroelectric grid --- Lower Colorado region
[DOE/SF/10505-1] N80-13663
COMBINATORIAL ANALYSIS
Computer description of Black Hawk helicopter
[AD-A073444] N80-13031
COMBUSTION
Characteristic parameters in combustion processes and their accessibility to current and future diagnostics
[ORO-5773-T1] N80-13197
Combustion of solid carbon rods in zero and normal gravity
[NASA-TM-79303] N80-13404
Experimental and predicted performance for the combustion of a low heating value gas in a swirl burner --- finite difference analysis
N80-13467
COMBUSTION CHAMBERS
Advanced catalytic combustors for low pollutant emissions, phase 1
[NASA-CR-159535] N80-13048
Orbital Transfer Vehicle [OTV] engine study. Phase A: Extension
[NASA-CR-161338] N80-13160
Stability analysis of a liquid fuel annular combustion chamber
[NASA-CR-159734] N80-13165
Carbon particulate measurements in a diesel engine --- particle size distribution
[SAND-79-8210] N80-13725
COMBUSTION EFFICIENCY
Design and evaluation of high performance rocket engine injectors for use with hydrocarbon fuels
[NASA-TM-79319] N80-13163
COMBUSTION PHYSICS
Laser ignition of solid propellant formulations
[AD-A073316] N80-13270
COMBUSTION PRODUCTS
Application of synthetic molecular sieve zeolites and silica gel toward the separation of sulfur dioxide from combustion gases
N80-13180
Regenerative process for desulfurization of high temperature combustion and fuel gases
[BNL-50944] N80-13277
COMBUSTION STABILITY
Analysis of combustion instability in liquid fuel rocket motors
[NASA-CR-159733] N80-13164
Stability analysis of a liquid fuel annular combustion chamber
[NASA-CR-159734] N80-13165
Amplification of Reynolds number dependent processes by wave distortion --- liquid fuel combustor stability
[NASA-CR-159732] N80-13193
COMMAND AND CONTROL
The use of a microprocessor for the manipulation and representation of large amounts of data on a color television monitor
[FB-39] N80-13795
COMMERCIAL ENERGY
Commercialization strategy report for coal liquefaction
[TID-28846] N80-13285
COMMUNICATION EQUIPMENT
Feasibility study within the Spacelab utilization program: Common equipment, communication/navigation [COMNAV]
[BMFT-FB-W-78-36] N80-13130
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160404] N80-13334
COMMUNICATION NETWORKS
Dynamic behavior of shortest path routing algorithms for communication networks
[AD-A073487] N80-13338
British Post Office VIEWDATA interfacing to a data communication network
[NPL-DNACS-1/78] N80-13343
Interconnection networks in multiple-processor systems --- communication networks
N80-13784
COMMUNICATION SATELLITES
Mathematical problems arising from passive intermodulation interference in communications satellites
N80-13321
COMPARISON
Application of a tracking and Data Relay Satellite System [TDRSS] to European requirements
[BMFT-FB-W-78-37] N80-13131
COMPILERS
A compiler design for multiple independent processor computers
N80-13786
Comparison of direct code generation and intermediate language generation for bootstrapping the machine-independent compiler, LITTLE
N80-13798
COMPONENT RELIABILITY
Evaluation and application of an intensified CCD array photometer for astronomical observations
N80-13995
COMPOSITE MATERIALS
Space fabrication demonstration system. Composite beam cap fabricator development, phase 1 and 2
[NASA-CR-161348] N80-13068
Measurement of the electrical properties of composite materials in the frequency range of DC to 30 MHz
[AD-A073638] N80-13175
Deformation and failure infor.nation from composite materials via acoustic emission
[UCRL-81272] N80-13177
Electronmicroscopic study of sand erosion processes in metals
[AD-A073497] N80-13220
Curing and flow of thermosetting resins for composite material pultrusion
N80-13244
COMPOSITE STRUCTURES
Manufacturing cost data collection and analysis for composite production hardware
[AD-A073507] N80-13174
Feasibility of SiC composite structures for 1644 deg gas turbine seal applications
[NASA-CR-159597] N80-13474
COMPRESSED GAS
Shock compression of liquid methane and the principle of corresponding states
[UCRL-82127] N80-13410

COMPRESSIBLE FLOW
High speed ejectors --- investigation of ejector performance in compressible flow
[AD-A073378] N80-13051
COMPRESSIVE STRENGTH
Effects of metallurgical microstructure of armatures on compressed magnetic field generators
[SAND-79-0890C] N80-13375
COMPRESSOR BLADES
The performance estimation of an axial-flow compressor stage using theoretically derived blade element characteristics with experimental comparison
N80-13466
COMPTON EFFECT
Vector current scattering in two dimensional quantum chromodynamics
[LBL-9022] N80-13907
A theoretical investigation of the electronic band structure and bulk properties of diamond
N80-13953
Compton shift of X-rays in plasma clouds: Typical radiation spectra
[PR-441] N80-14000
COMPUTER GRAPHICS
British Post Office VIEWDATA interfacing to a data communication network
[NPL-DNACS-1/78] N80-13343
Interactive aids for cartography and photo interpretation --- aerial photography
[AD-A073452] N80-13603
SLIC: An interactive mesh generator for finite element and finite difference application programs
[UCRL-81931] N80-13793
Parallel interactive processing in shaded color graphics
N80-13801
An investigation of optimization techniques for drawing computer graphics displays
[NASA-CR-162509] N80-13814
Using intelligent graphics terminals in real-time processing
[AD-A073760] N80-13823
SURFED: An interactive editor for free-form surfaces
[AD-A073424] N80-13825
COMPUTER INFORMATION SECURITY
PDP-11 computer monitoring system
[AD-A072966] N80-13790
The transfer of information and authority in a protection system
[AD-A073370] N80-13791
COMPUTER NETWORKS
Processor and file allocation in distributed data base systems
N80-13787
The modeling of virtual memory systems --- computer networks
N80-13789
Distributed database organization for optimal computer network response time
N80-13828
COMPUTER PROGRAMMING
Analytical investigation of the landing dynamics of a large airplane with a load-control system in the main landing gear
[NASA-TP-1555] N80-13025
Generating correct programs from logic specifications
N80-13799
Computational experiments with zero-one programming algorithms and heuristics
N80-13800
Real-time emulation of hardware
N80-13802
On some graph-theoretic problems in program testing
N80-13811
Lecture notes on ordinary differential equations software, user's guide for ODE, RKF45, GEAR and EPISODE
[ORNL/CSD/TM-64] N80-13849
PAVE PAWS modern programming data collection system
[AD-A073357] N80-13984
COMPUTER PROGRAMS
Aerodynamic preliminary analysis system. Part 1: Theory --- linearized potential theory
[NASA-CR-145284] N80-12998
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 1: Final report
[NASA-CR-159691] N80-13043
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 2: Users manual
[NASA-CR-159692] N80-13044
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 3: Library of maps
[NASA-CR-159693] N80-13045
A numerical solution for rocket ascent trajectory
[AD-A073346] N80-13166
IVFOR: A user oriented program characterizing the current-voltage properties of a two terminal device
[SAND-79-0972] N80-13373
MINT computer program for numerical computation of turbulent flow: An overview
[GA-A-15148] N80-13415
Design sensitivity analysis and optimization of constrained dynamic systems
N80-13470
Application of finite element programs APES, ASAS and MARC to linear fracture mechanics
[LTR-ST-1118] N80-13511
Solar Total Energy Systems [STES] simulation program user's guide
[ORNL/SUB-7525/2] N80-13664
Photovoltaic transient analysis program user's guide. Volume 1: Executive summary
[SAND-78-7038-VOL-1] N80-13704
Expression continuity and the formal differentiation of algorithms
N80-13797
Verification of encapsulated implementations of algebraically specified data types
N80-13812
As-built design specification for CAMS Development Dot Data System [CDDDS]
[NASA-CR-160395] N80-13816
An exploratory study of the cognitive structures underlying the comprehension of software design problems
[AD-A073727] N80-13821
The work request system of a NASA QI package
[NASA-CR-162511] N80-13982
Photopolarimetry of scattering surfaces and their interpretation by computer model
[NASA-CR-162514] N80-14002
COMPUTER STORAGE DEVICES
The modeling of virtual memory systems --- computer networks
N80-13789
Measurement, modeling and management of phased program behavior
N80-13813
COMPUTER SYSTEMS DESIGN
The self-organizing data base
N80-13788
An exploratory study of the cognitive structures underlying the comprehension of software design problems
[AD-A073727] N80-13821
The George 3 and 4 accounting system
[RAE-TR-78080] N80-13983
COMPUTER SYSTEMS PROGRAMS
A digital computer program for the dynamic interaction simulation of controls and structure [DISCOS]. Volume 4: Supplementary documentation
[NASA-TM-80546] N80-13150
Data acquisition system for the Hamilton Standard W2 electron beam welder
[SAND-79-8014] N80-13482
Stochastic modelling for reliability and other performance measures of software systems with applications
N80-13486
Generating correct programs from logic specifications
N80-13799
Effect of program modifications on software performance
N80-13806
Measurement, modeling and management of phased program behavior
N80-13813
Spacelab interface development tests. Software description
[NASA-CR-160394] N80-13815
Software for nonlinear filtering
[AD-A073051] N80-13817
Programmable Video Digitizing System [PVDS]. Functional description and preliminary software considerations
[AD-A073756] N80-13822
COMPUTER TECHNIQUES
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 1: Final report
[NASA-CR-159691] N80-13043
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 2: Users manual
[NASA-CR-159692] N80-13044
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 3: Library of maps
[NASA-CR-159693] N80-13045
Use of virtual machines in the development of decision support systems
[AD-A073748] N80-13792
Mathematical Modeling of Diverse Phenomena
[NASA-SP-437] N80-13839
COMPUTERIZED DESIGN
Computer aided design of microcircuits. Citations from the NTIS data base
[NTIS/PS-79/0870/0] N80-13388
Computer aided design of microcircuits. Citations from the Engineering Index data base
[NTIS/PS-79/0871/8] N80-13389
SURFED: An interactive editor for free-form surfaces
[AD-A073424] N80-13825
A new method for the design of recursive digital filters and its fields of application
[ESA-TT-530-REV] N80-13930
COMPUTERIZED SIMULATION
Computer description of Black Hawk helicopter
[AD-A073444] N80-13031
A computerized VSTOL/small platform landing dynamics investigation model
[AD-A073587] N80-13033
Synthesis of a control model for a liquid nitrogen cooled, closed circuit, cryogenic nitrogen wind tunnel and its validation
[NASA-CR-162508] N80-13058
A digital computer program for the dynamic interaction simulation of controls and structure [DISCOS]. Volume 4: Supplementary documentation
[NASA-TM-80546] N80-13150
Investigation of high frequency oscillations in the OV102 elevon actuation subsystems using continuous system modeling program simulation
[NASA-CR-160407] N80-13151
Manufacturing cost data collection and analysis for composite production hardware
[AD-A073507] N80-13174
Computer simulation of martensitic transformations in idealized systems
[LBL-9264] N80-13228
Development of an electrical load demand and response model based on a rational synthesis from elementary devices
[DOE/ET-5109/1] N80-13371
Solar Total Energy Systems [STES] simulation program user's guide
[ORNL/SUB-7525/2] N80-13664
Methods for factor screening in computer simulation experiments
[AD-A073449] N80-13824
An iterative unfolding technique
[ARWE-O-25/79] N80-13853
COMPUTERS
Fault test generation for sequential circuits: A search directing heuristic
N80-13353
A compiler design for multiple independent processor computers
N80-13786
CONCENTRATING
Reconsideration of macrosegregation during nonstationary solidification
N80-13106
CONCENTRATION [COMPOSITION]
The fate of dissolved aluminum within the oceans
N80-13586
An asymptotic expansion approach to the inverse radiative transfer problem --- to infer concentration profiles of the atmosphere from measurements made onboard a satellite
[NASA-TP-1587] N80-13730
CONCENTRATORS
Linear concentration solar collector in an air supported enclosure. Preliminary design study
[SAND-78-7022] N80-13644
Novel concentrator photovoltaic converter system development
[SAND-79-7040] N80-13661
Experimental and theoretical evaluation of a novel concentrating solar energy collection system
[SAND-79-1053C] N80-13671
Photovoltaic concentrator application experiment. Phase 1: A 150 kW photovoltaic concentrator power system for load-center applications with feedback into the utility grid
[DOE/CS-34267/1] N80-13688
CONCRETES
Conceptual design study of a concrete canister spent-fuel storage facility
[AECL-6301] N80-13902
CONDENSERS [LIQUIFIERS]
Condensor operated inverse thermosiphons
[NEL-659] N80-13422
CONDENSING
Synthesis of improved polyester resins
[NASA-CR-159665] N80-13257
CONDUCTIVE HEAT TRANSFER
INCAP: A finite element program for one-dimensional nonlinear inverse heat conduction analysis
[ORNL/NUREG/CSD/TM-8] N80-13407
Heat conduction from a sphere to an infinite external region
[SAND-79-0366] N80-13419
CONDUCTIVITY METERS
Two-phase flow measurements with advanced instrumented spool pieces and local conductivity probes
[CONF-790745-1] N80-13413
A new thermal conductivity apparatus for small conducting specimens and measurememts on niobium monoxide --- measuring thermal conductivity, electrical resistivity, and thermoelectric power
N80-13428
CONFERENCES
In depth review of the 1979 AIAA Lighter-Than-Air Systems Technology Conference
[NASA-TM-81158] N80-12991
Material sciences in space --- conference proceedings, Grenoble, Apr. 1979
[ESA-SP-142] N80-13069
Flight Technology Improvement --- spaceborne optical radiometric instruments, attitude control, and electromechanical and power subsystems
[NASA-CP-2101] N80-13152
Nuclear-Pumped Lasers --- efficient conversion of energy liberated in nuclear reactions to coherent radiation
[NASA-CP-2107] N80-13438

Time-dependent fracture of materials at elevated temperature --- conference
[CONF-790236] N80-13520
Magnetospheric boundary layers --- conference proceedings, Albach, Austria, Jun. 1979
[ESA-SP-148] N80-13529
Cogeneration opportunities --- conferences
[CONF-7806118] N80-13681
Report of the fifth planning meeting for the Monsoon Experiment [MONEX]. Part 1: Winter MONEX
[GARP-SPEC-REPT-30] N80-13748
Contributions to the Fourth Solar Wind Conference --- conference, Burghausen, West Germany, 1978
[MPI-PAE/EXTRATERR-154] N80-14008

CONFIDENCE LIMITS
Estimation of smoothing parameters to smooth noisy data and confidence regions for the underlying function
N80-13856

CONFORMAL MAPPING
Solution of the Chapman-Ferraro problem within two dimensions
N80-13569

CONGRESSIONAL REPORTS
Standard reference data program authorization
[GPO-25-887] N80-13315
Oversight: FAA R and D programs --- air traffic control and collision avoidance
[GPO-38-212] N80-13988

CONGRUENCES
On congruence subgroup problem and related topics
N80-13873

CONICAL BODIES
Experiments on the stability of conical and cylindrical liquid columns at low Bond numbers
N80-13110
Equivalence principle as applied to conical arrays
[AD-A073384] N80-13335

CONSTRUCTION
Solar power satellite system definition study. Volume 6, phase 1: Space construction and transportation
[NASA-CR-160375] N80-13144

CONSTRUCTION MATERIALS
Fire-resistant materials for aircraft passenger seat construction
[NASA-TM-78617] N80-13255

CONTAINERLESS MELTS
Floating zone stability [exp. 1-ES-331] --- on board Spacelab
N80-13078

CONTEXT FREE LANGUAGES
Bounded nondeterminism and the parallel parsing of context-free languages
N80-13804

CONTINENTAL SHELVES
Long water wave propagation under the influence of the depth variation. Part 1: Long water waves incident upon a transition zone of an exponential depth variation. Part 2: Long water waves incident upon a seamount model of a linearly cylindrical depth variation
N80-13584

CONTINUOUS WAVE LASERS
CW nuclear pumped lasing of 3He-Ne
N80-13442
A purely chemical HBr laser
[AD-A060841] N80-13454
Application of coatings by high energy CW lasers
[AD-A073347] N80-13456

CONTROL
Active flutter control for flexible vehicles, volume 1
[NASA-CR-159160] N80-13053
Controlling magnetic field profiles
[SAND-79-0678] N80-13876

CONTROL DATA [COMPUTERS]
TFILE: A user callable tape file archiving system for NOS
[SAND-78-2022] N80-13829

CONTROL EQUIPMENT
Mechanical power system for aircraft intermittent utility functions --- systems engineering of using flywheels for aircraft control equipment
[AD-A073297] N80-13030

CONTROL SIMULATION
On the problem of spring loaded resistance to simple and complex positioning of a control stick --- in manual control experiments
[FB-40] N80-13778

CONTROL STICKS
On the optimization of spring elasticity, damping, and inertia effects on the spring loading of a control stick
[FB-37] N80-13776
On the problem of spring loaded resistance to simple and complex positioning of a control stick --- in manual control experiments
[FB-40] N80-13778

CONTROL SURFACES
Force and moment data from a wind-tunnel test of a tilt-nacelle V/STOL propulsion system with an attitude control vane --- conducted in Ames 40 by 80 foot wind tunnel
[NASA-TM-81157] N80-13003

CONTROLLED ATMOSPHERES
Controlling the clean room atmosphere
[GEPP-OP-405] N80-13138

CONTROLLERS
Performance of 22.4-kW nonlaminated-frame dc series motor with chopper controller --- a dc to dc voltage converter
[NASA-TM-79252] N80-13361

CONVECTION CURRENTS
Ionospheric convection at high latitudes
N80-13551
Antiparallel merging, the half-wave rectifier response of the magnetosphere, and convection
N80-13573

CONVECTIVE FLOW
Convective processes at low gravity
N80-13073
Experiment SYRENA 1, 2, 3: Space processing of CdHgTe, CdHgTe and PbSeTe
N80-13076
Influence of the space environment on some materials processing phenomena
N80-13077
Flow phenomena in rotating floating zones with and without Marangoni convection
N80-13104
Steady and oscillatory Marangoni convection in floating zones under 1g
N80-13111
Marangoni boundary layers
N80-13114
Marangoni convection in a liquid layer subjected to rotation about a transverse axis
N80-13115

CONVECTIVE HEAT TRANSFER
Convective processes at low gravity
N80-13073
Convective heat transfer during dendritic growth
N80-13108
Numerical and experimental simulation of microgravity-convection
N80-13112
Convective ignition of nitrocellulose based propellants in unsteady flow fields
[AD-A073546] N80-13271

CONVERGENCE
Superlinearly globally convergent algorithms for nonlinear programming via sequential linear programs
N80-13808

CONVERGENT-DIVERGENT NOZZLES
Experimental investigations of nonequilibrium flashing of water in a converging-diverging nozzle
[BNL-NUREG-25716] N80-13417

CONVERSION
Solar energy perspectives for public power
[SERI/TP-35-300] N80-13635

CONVEXITY
Algorithms for network flow problems with convex separable costs
N80-13871

COOLING
Heat pipe cooled power magnetics
[NASA-CR-159659] N80-13362
Heat conduction from a sphere to an infinite external region
[SAND-79-0366] N80-13419
Solar cooling performance in CSU Solar House 3
[COO-2858-23] N80-13668

COOLING SYSTEMS
Aerothermal performance of radiatively and actively cooled panel at Mach 6.6
[NASA-TP-1595] N80-13402

COPOLYMERS
A study of ternary systems containing an acidic copolymer, a basic copolymer and a solvent
N80-13250

COPPER
Dispersed gaseous and solid phases in molten and solidified Cu
N80-13080
Initial epitaxy and interdiffusion phenomena in Au-Cu bilayers --- microstructure
N80-13948

COPPER ALLOYS
An investigation of multi-axial creep characteristics of metals
[NEL-661] N80-13242
Transport properties of the compositionally modulated alloy Cu/Ni
[CONF-790341-8] N80-13970

COPPER COMPOUNDS
deHass-vanAlphen measurements of spin resolved scattering in the Cu[Mn] magnetic impurity system
N80-13955

CORE SAMPLING
The analysis of sediment samples for hydrocarbons
[AD-A073822] N80-13754

CORONAS
Equilibrium plasma corona surfaces
[UCID-18228] N80-13942
Surface motion and confinement potential for a microwave confined corona
[UCID-18227] N80-13943

CORPUSCULAR RADIATION
Impulsive penetration of solar wind and its effects on the upper atmosphere
N80-13576
Impulsive penetration and viscous interaction
N80-13577

CORROSION
Scanning reference electrode techniques in localized corrosion
[BNL-26094] N80-13238
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0815/5] N80-13716

CORROSION PREVENTION
Corrosion control of Hardened Intersite Cable System [HICS] splice case
[AD-A073431] N80-13219
Development of tungsten coatings for the corrosion protection of alumina-based ceramics
[CONF-790442-13] N80-13261

CORROSION RESISTANCE
Development and evaluation of materials for high temperature lithium/sulfur rechargeable batteries
[DOE/TIC-10098] N80-13682

CORROSION TESTS
Corrosion control of Hardened Intersite Cable System [HICS] splice case
[AD-A073431] N80-13219

COSMIC NOISE
Direct measurements of the spectrum of the near millimeter cosmic background
[LBL-9374] N80-14016

COSMIC PLASMA
Radial discontinuities in low-energy magnetospheric plasma observed on GEOS-1
N80-13537
First observations of a heated plasma component in the plasma mantle
N80-13538
First observations of the hot ion composition in the high altitude magnetospheric boundary layer by means of Prognoz-7
N80-13539
Internal magnetospheric plasma flow
N80-13574

COSMIC RAYS
Direct measurements of the spectrum of the near millimeter cosmic background
[LBL-9374] N80-14016

COST ANALYSIS
Establishment criteria for Distance Measurement Equipment [DME] with instrument landing system and/or localizer approach
[AD-A069818] N80-13016
Installation criteria for the Approach Lighting System Improvement Program [ALSIP]
[AD-A070076] N80-13057
Application of a tracking and Data Relay Satellite System [TDRSS] to European requirements
[BMFT-FB-W-78-37] N80-13131
Two-impulse reorientation of asymmetric spacecraft
[NASA-TP-1554] N80-13135
Manufacturing cost data collection and analysis for composite production hardware
[AD-A073507] N80-13174
Membrane oxygen enrichment cost and application evaluation
[ANL-78-108] N80-13205
Cost analysis of packed beds for thermal energy storage
[CAES-11] N80-13687

COST EFFECTIVENESS
The near-term potential of manufacturing in space
N80-13125
Feasibility study within the Spacelab utilization program: Common equipment, communication/navigation [COMNAV]
[BMFT-FB-W-78-36] N80-13130

COST REDUCTION
Federal Laboratory Consortium for Technology Transfer. Far West Region Local Government Assistance Task Force
[UCID-18037-79-2] N80-13990

COUPLED MODES
Resonant Raman scattering from electron-phonon coupled modes in 3-V semiconductors
N80-13356

COUPLING
An orbital localization method and an iterative procedure for calculating nuclear magnetic resonance coupling constants
N80-13189

COVARIANCE
Maximum likelihood estimation of the autoregressive coefficients and moving average covariances of vector autoregressive moving average models
[AD-A073788] N80-13845

CRACK INITIATION
Particle impact damage in silicon nitride, part 3
[AD-A073570] N80-13172
Combined macroscopic and microscopic approach to the fracture of metals
[COO-3084-69] N80-13229
The implementation and practical verification of a superposition method for the solution of elastic crack problems
[RAE-TM-STRUCT-940] N80-13527

CRACK PROPAGATION
Fracture studies in ceramics with particular emphasis on beta'-alumina
N80-13243
Elastodynamic diffraction and radiation problems
N80-13505

Comparison tests and experimental compliance calibration of the proposed standard round compact plane strain fracture toughness specimen
[NASA-TM-81379] N80-13513
Elastic plastic analysis of growing cracks
[COO-3084-65] N80-13517
Application of static and dynamic crack arrest theory to thermal shock experiment TSE-4 --- fracture behavior of reactor pressure vessels
[NUREG-CR-0767] N80-13524
The implementation and practical verification of a superposition method for the solution of elastic crack problems
[RAE-TM-STRUCT-940] N80-13527
A testing machine which fulfills fixed boundary displacement conditions
[TRITA-HFL-0022] N80-13528

CRACKING [CHEMICAL ENGINEERING]
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels [riser cracking of coal]
[FE-2307-46] N80-13280
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-33] N80-13287

CRACKING [FRACTURING]
Hertzian fracture of Pyrex glass and alpha quartz N80-13510

CRACKS
Modelling of crack tip deformation with finite element method and its aplications N80-13503

CREEP PROPERTIES
Creep behavior of precipitation and oxide dispersion strengthened superalloys N80-13213
Cyclic creep behavior of pure aluminum and 7050 aluminum alloy N80-13214
Combined macroscopic and microscopic approach to the fracture of metals
[COO-3084-69] N80-13229
Fatigue and delayed failure of refractory metals --- canadium and niobium hydride alloys
[COO-3459-14] N80-13233
Fatigue and creep behavior of Si3N4 and SiC for gas turbine applications
[EPRI-FP-1060] N80-13483

CREEP TESTS
Experiment and prediction in the bending of a nickel beam at 200 deg C
[COO-2733-21] N80-13519

CROP GROWTH
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Estimation of regional evapotranspiration and soil moisture conditions using remotely sensed crop surface temperatures
[REPT-[003] N80-13616

CROP IDENTIFICATION
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study --- Kansas
[E80-10012] N80-13591

CROP INVENTORIES
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595

CROSS CORRELATION
Estimation of the spectral moments and quadrature cross-correlation functions and their application to troposcatter systems N80-13322

CROSS FLOW
Convective ignition of nitrocellulose based propellants in unsteady flow fields
[AD-A073546] N80-13271

CRUDE OIL
Temperature dependence of the viscosity of some crude oils and pure liquids N80-13182
Current U. S. petroleum situation and short-term supply/demand outlook
[DOE/EIA-0184/5] N80-13607
The analysis of sediment samples for hydrocarbons
[AD-A073822] N80-13754

CRYOGENIC WIND TUNNELS
Synthesis of a control model for a liquid nitrogen cooled, closed circuit, cryogenic nitrogen wind tunnel and its validation
[NASA-CR-162508] N80-13058

CRYSTAL DEFECTS
Neutron spectroscopy of fast hydrogen diffusion in BCC transition metals
[BNL-26075] N80-13225
Interstitial-impurity trapping in Al-Fe and Al-Zn
[COO-1198-1267] N80-13975
Characterization of heat treatment induced changes in Li-NA beta-alumina single crystals
[CONF-790538-6] N80-13978

CRYSTAL DISLOCATIONS
Epitaxy and misfit dislocations in large misfit systems
[CONF-790442-17] N80-13972

CRYSTAL GROWTH
The multipurpose apparatus Crystal for process experiments in space N80-13070
Crystal growth from the vapor phase with an inert component present N80-13075
Preparatory experiments for the growth of silicon single crystals in the mirror heating facility of Spacelab N80-13079
Flow phenomena in rotating floating zones with and without Marangoni convection N80-13104
Nonstationary analysis of the macrosegregation during the solidification in the space of the system Ge-Ga N80-13107
Convective heat transfer during dendritic growth N80-13108
Steady and oscillatory Marangoni convection in floating zones under 1g N80-13111
Results of French experiments on crystal growth from a vapor phase conducted on the ground as a part of the space program N80-13116
Contributions to Marangoni convection in cylindric melting zones: Experimental simulation and calculation of the influence of gravity
[BMFT-FB-W-78-39] N80-13421

CRYSTAL LATTICES
Oxygen diffusion in close packed oxides N80-13179
Loss of lattice rigidity in austenite
[AD-A073280] N80-13221
Solitary wave propagation in the three-dimensional lattice
[AD-A071458] N80-13965
Epitaxy and misfit dislocations in large misfit systems
[CONF-790442-17] N80-13972

CRYSTAL STRUCTURE
Structural and physical characteristics of InSb single crystals grown under near-zero gravity conditions N80-13071
Absence of crystalline order in two-dimensions --- thermodynamic study of electron transitions in crystal structure for crystalline order
[AD-A073672] N80-13968
Properties of single crystal beta-aluminas
[CONF-790538-9] N80-13977

CRYSTAL SURFACES
Domain and surface structures of sodium tungsten bronzes, Na/sub x/WO3 [0.4 x 1]
[ANL-78-63] N80-13237

CRYSTALLINITY
Absence of crystalline order in two-dimensions --- thermodynamic study of electron transitions in crystal structure for crystalline order
[AD-A073672] N80-13968

CRYSTALLITES
Formation and coalescence of epitaxial crystallites in nickel electrodepositon in air and argon atmospheres N80-13947
Melting behavior of small tin crystallites N80-13950

CRYSTALLOGRAPHY
Analytical electron microscope study of the omega phase transformation in a zirconium-nobium alloy
[ORNL/TM-6705] N80-13240

CURRENT CONVERTERS [AC TO DC]
Harmonic current propagation on AC systems due to HUDC links N80-13326

CURRENT DENSITY
Experimental investigation of the absolute tunneling current density in field emission from tungsten (110) N80-13963

CURRENT SHEETS
Birkeland currents and the interplanetary magnetic field N80-13554
Towards a more quantitative understanding of dayside magnetopause currents N80-13578

CURVE FITTING
Systems of frequency curves generated by transformations of logistic variables
[AD-A073481] N80-13847

CYCLIC LOADS
Cyclic creep behavior of pure aluminum and 7050 aluminum alloy N80-13214

CYCLONES
The influence of thermal fronts upon the solutions of an analytical model of a mid-latitude wave-cyclone N80-13740

CYLINDRICAL ANTENNAS
A filamentary multipole model for cylindrical antennas N80-13320

CYLINDRICAL BODIES
Experimental study of heat transfer from a yawed cylinder to air with a constant wall heat flux
[SAND-79-8022] N80-13005
Experiments on the stability of conical and cylindrical liquid columns at low Bond numbers N80-13110
Development of mainshaft high-speed cylindrical roller bearings for gas turbine engines
[AD-A073381] N80-13475
Thermoviscoplastic response of cylindrical structures using a state variable model
[COO-2733-19] N80-13516

CYLINDRICAL SHELLS
Dynamic plastic buckling of shells: A reconsideration of the Vaughan-Florence analysis
[CONF-790802-1] N80-13518

CYLINDRICAL TANKS
Conceptual design study of a concrete canister spent-fuel storage facility
[AECL-6301] N80-13902

CZECHOSLOVAKIA
Czechoslovakian preliminary program of material research in space N80-13095

D

DATA ACQUISITION
Compilation of data relevant to nuclear pumped lasers, volume 5
[AD-A073575] N80-13457
Data acquisition system for the Hamilton Standard W2 electron beam welder
[SAND-79-8014] N80-13482
A starting rule for data collection in queueing simulations
[AD-A073622] N80-13842
A stopping rule for data collection in queueing simulations
[AD-A073624] N80-13843

DATA BASES
Standard reference data program authorization
[GPO-25-887] N80-13315
A structured logical database design methodology, volumes 1 and 2 N80-13781
A specification of data structures with application to data base systems N80-13782
Processor and file allocation in distributed data base systems N80-13787
The self-organizing data base N80-13788
As-built design specification for CAMS Development Dot Data System [CDDDS]
[NASA-CR-160395] N80-13816
Distributed database organization for optimal computer network response time N80-13828

DATA COLLECTION PLATFORMS
Snow mapping from space platforms N80-13611

DATA COMPRESSION
The application of formal models to a fully adaptive general purpose digital data compression system N80-13785
Extreme sample censoring problems with multivariate data, 2
[AD-A073563] N80-13848
A density-quantile function approach to choosing order statistics for the estimation of location and scale parameters
[AD-A073270] N80-13866

DATA CONVERSION ROUTINES
Utility language for the NMFECC
[CONF-781053-4] N80-13827

DATA LINKS
Spacelab interface development test, volume 1, sections 1-6
[NASA-CR-160411] N80-13149
Operational procedures for ground station operation: ATS-3 Hawaii-Ames satellite link experiment
[NASA-TM-81155] N80-13333
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160404] N80-13334
Optical digital techniques
[NASA-CR-160392] N80-13922

DATA MANAGEMENT
Measurement, modeling and management of phased program behavior
N80-13813
The work request system of a NASA Q1 package
[NASA-CR-162511] N80-13982
PAVE PAWS modern programming data collection system
[AD-A073357] N80-13984
DATA PROCESSING
On the design and realization of two dimensional digital filters
N80-13351
Digital processing of LANDSAT MSS and topographic data to improve capabilities for computerized mapping of forest cover types --- Colorado and Washington
[E80-10009] N80-13588
Earth observations division Earth resources data analysis capabilities
[E80-10013] N80-13592
Texas applications system verification and transfer remote sensing information subsystem: Functional design
[E80-10017] N80-13596
Building efficient pass-oriented attribute grammar evaluators
N80-13796
The complexity of the maximum subgraph problem
N80-13809
Utility language for the NMFECC
[CONF-781053-4] N80-13827
Discussion of paper by Good and Gaskins on density estimation and bump hunting
[AD-A073269] N80-13867
DATA PROCESSING EQUIPMENT
Spacelab interface development tests. Software description
[NASA-CR-160394] N80-13815
DATA PROCESSING TERMINALS
The use of a microprocessor for the manipulation and representation of large amounts of data on a color television monitor
[FB-39] N80-13795
Using intelligent graphics terminals in real-time processing
[AD-A073760] N80-13823
DATA REDUCTION
Earth observations division Earth resources data analysis capabilities
[E80-10013] N80-13592
Discussion of paper by Good and Gaskins on density estimation and bump hunting
[AD-A073269] N80-13867
PAVE PAWS modern programming data collection system
[AD-A073357] N80-13984
DATA RETRIEVAL
Performance measurement and analysis of certain search algorithms
N80-13803
DATA SAMPLING
An empirical power study of recursive outlier detection procedures
N80-13854
DATA SMOOTHING
Digital filtering techniques for use in minicomputers
[Y-2184] N80-13380
Estimation of smoothing parameters to smooth noisy data and confidence regions for the underlying function
N80-13856
DATA STORAGE
Processor and file allocation in distributed data base systems
N80-13787
Queues and stores with nonhomogeneous input
N80-13830
DATA SYSTEMS
Space Observations for water resources: A potential to be developed
N80-13609
DATA TRANSMISSION
Error performance of differentially coherent detection of binary DPSK data transmission on the hard-limiting satellite channel
[AD-A073377] N80-13337
British Post Office VIEWDATA interfacing to a data communication network
[NPL-DNACS-1/78] N80-13343
DAYTIME
Ion composition in the Dayside Cusp: Injection of ionospheric ions into the high latitude boundary layer
N80-13553
Dayside aurora and substorm current systems
N80-13555
DECAY RATES
Experimental setup for decomposition of UF6
N80-13441
DECELERATION
Centrifugal instability of decelerating swirl-flow within finite and infinite circular cylinders
N80-13391
DECISION MAKING
Use of virtual machines in the development of decision support systems
[AD-A073748] N80-13792
DECISION THEORY
Gamma-minimax and minimax decision rules for comparison of treatments with a control
[AD-A073576] N80-13834
Some contributions to gamma-minimax and empirical Bayes selection procedures
[AD-A073574] N80-13869
DECOMPOSITION
Experimental setup for decomposition of UF6
N80-13441
Invariant subspaces associated with decomposition
N80-13874
DEFORMATION
Deformation and failure information from composite materials via acoustic emission
[UCRL-81272] N80-13177
DEGREES OF FREEDOM
The equations of motion of an aircraft embracing its whole-body and deformational degrees of freedom
[RAE-TR-79010] N80-13037
The effect of analysis bandwidth on the accuracy of measurements and predictions of single degree of freedom system behavior
[AMTE[N]-TM-79401] N80-13526
DELINEATION
Image segmentation by statistical edge detection and sequential edge growing
N80-13831
DEMAND [ECONOMICS]
Development of an electrical load demand and response model based on a rational synthesis from elementary devices
[DOE/ET-5109/1] N80-13371
Current U. S. petroleum situation and short-term supply/demand outlook
[DOE/EIA-0184/5] N80-13607
DENDRITIC CRYSTALS
Convective heat transfer during dendritic growth
N80-13108
DENSITOMETERS
X-ray and gamma ray transmission densitometry
[CONF-790692-1] N80-13910
DENSITY DISTRIBUTION
Experimental investigation of the local density and temperature distribution in the flow field around a sphere with high thermodynamic nonequilibrium using the electron beam technique
[ESA-TT-516-REV] N80-13012
DEPOSITION
Relativistic electron bean energy deposition in thin gold and aluminum targets
[SAND-78-2026] N80-13901
DESIGN ANALYSIS
Analysis and correlation with theory of rotor lift-limit test data
[NASA-CR-159139] N80-13028
Design assessment of advanced technology lightweight, low-cost mission-configured gondola modules
[AD-A073554] N80-13029
Advanced catalytic combustors for low pollutant emissions, phase 1
[NASA-CR-159535] N80-13048
Optimal design of flexible chemical processes
N80-13187
On the design and realization of two dimensional digital filters
N80-13351
Eight-tesla synchroton dipoles: Design alternatives
[LBL-8410] N80-13376
Design sensitivity analysis and optimization of constrained dynamic systems
N80-13470
Development of mainshaft high-speed cylindrical roller bearings for gas turbine engines
[AD-A073381] N80-13475
Experimental investigation of a solid fuel ramjet
[DFVLR-FB-78-27] N80-13485
Structural optimization under shock and vibration environment
N80-13496
Photovoltaic transient analysis program user's guide. Volume 1: Executive summary
[SAND-78-7038-VOL-1] N80-13704
Weight minimization of sandwich type solar collector panels
[SAND-78-2305C] N80-13710
Design and analysis of transient high voltage electrical devices: Ozone production in fast pulsed dielectric barrier discharges in oxygen and modeling of an intense relativistic electron beam source
N80-13890
Evaluation of surface aerator applications in the activated sludge process
N80-13987
DESTRUCTIVE TESTS
Development and evaluation of an ablative closeout material for solid rocket booster thermal protection system
[NASA-TM-78241] N80-13258
DESULFURIZING
Regenerative process for desulfurization of high temperature combustion and fuel gases
[BNL-50944] N80-13277
DETONATION WAVES
Effects of cellular structure on the behavior of gaseous detonation waves under transient conditions
[UCRL-82270] N80-13411
DEUTERIUM PLASMA
Damage of metal surfaces by a hot, dense deuterium plasma
N80-13212
DIAGNOSIS
Reliability, validity and application of an improved scale for assessment of motion sickness severity
[AD-A069130] N80-13766
DIAMONDS
A theoretical investigation of the electronic band structure and bulk properties of diamond
N80-13953
DIELECTRIC PROPERTIES
Dipolar defect structure of laser and other transparent materials --- study of dielectric properties of insulators
[AD-A073815] N80-13458
Surface-wave scattering by dielectric gratings with arbitrary profiles
N80-13964
DIELECTRICS
Radiation fields of dielectric optical waveguides
N80-13325
Quasi-static electric field build-up between two spherical conductors
[UCID-18236] N80-13372
Design and analysis of transient high voltage electrical devices: Ozone production in fast pulsed dielectric barrier discharges in oxygen and modeling of an intense relativistic electron beam source
N80-13890
Charge carrier mobility and transmission across the liquid-vapor interface for the dielectric liquid hydrogen
N80-13899
Surface-wave scattering by dielectric gratings with arbitrary profiles
N80-13964
DIESEL ENGINES
Carbon particulate measurements in a diesel engine --- particle size distribution
[SAND-79-8210] N80-13725
DIFFERENTIAL CALCULUS
Expression continuity and the formal differentiation of algorithms
N80-13797
DIFFERENTIAL EQUATIONS
Delta-Rho, a second order trajectory perturbation technique
N80-13133
Computational experiments on two error estimation procedures for ordinary differential equations
[AD-A073768] N80-13844
Lecture notes on ordinary differential equations software, user's guide for ODE, RKF45, GEAR and EPISODE
[ORNL/CSD/TM-64] N80-13849
DIFFRACTION
Elastodynamic diffraction and radiation problems
N80-13505
DIFFUSE RADIATION
Molecular two dimensional flow of mixtures of light and heavy gases with diffuse and specular reflection
[ESA-TT-508-REV] N80-13011
DIFFUSION COEFFICIENT
Oxygen diffusion in close packed oxides
N80-13179
The elastic modulus and diffusion coefficents of silver-palladium composition modulated foils
N80-13216
DIFFUSION FLAMES
Effect of pressure on structure and NO sub X formation in CO-air diffusion flames
[NASA-TP-1448] N80-13191
DIFFUSION THEORY
Asymptotic theory for process least squares estimators for diffusion processes
[AD-A073577] N80-13864
DIFFUSIVITY
Neutron spectroscopy of fast hydrogen diffusion in BCC transition metals
[BNL-26075] N80-13225
DIGITAL COMPUTERS
A digital computer program for the dynamic interaction simulation of controls and structure [DISCOS]. Volume 4: Supplementary documentation
[NASA-TM-80546] N80-13150
DIGITAL FILTERS
An investigation of the effects of analog and digital systems on signal fidelity
N80-13327
On the design and realization of two dimensional digital filters
N80-13351
Digital filtering techniques for use in minicomputers
[Y-2184] N80-13380
An empirical power study of recursive outlier detection procedures
N80-13854
A new method for the design of recursive digital filters and its fields of application
[ESA-TT-530-REV] N80-13930
DIGITAL SIMULATION
Digital load control applied to full-scale airframe fatigue tests
[AD-A073588] N80-13054

A functional simulation system for MSI and LSI systems
N80-13346

DIGITAL SYSTEMS
Error performance of differentially coherent detection of binary DPSK data transmission on the hard-limiting satellite channel
[AD-A073377] N80-13337
Count state analysis of a digital phase locked loop
N80-13352

DIGITAL TECHNIQUES
Digital detection by digital signal processing techniques --- detection performance in presence of noise introduced by the analog to digital converter
N80-13331
Snow mapping from space platforms
N80-13611
The application of formal models to a fully adaptive general purpose digital data compression system
N80-13785
Optical digital techniques
[NASA-CR-160392] N80-13922

DIRECT CURRENT
Performance of 22.4-kW nonlaminated-frame dc series motor with chopper controller --- a dc to dc voltage converter
[NASA-TM-79252] N80-13361

DIRECTIONAL SOLIDIFICATION [CRYSTALS]
The influence of space conditions on directional crystallization of germanium and its properties
N80-13072
Unidirectional solidification of eutectic iron-carbon alloys and the segregation of sulfur
N80-13085
Solidification of some eutectic alloys under microgravity conditions and at 1 g
N80-13097
Preparatory studies for an experiment in directional solidification of immiscible Al-In alloys on board a rocket vehicle
N80-13100
Reconsideration of macrosegregation during nonstationary solidification
N80-13106
Nonstationary analysis of the macrosegregation during the solidification in the space of the system Ge-Ga
N80-13107
Study of the influence of gravity on the solidification of irregular eutectic alloys
N80-13119
Manufacturing of oxide glasses. Critical comment on proposals for melting and solidification experiments under zero-g conditions
[BMFT-FB-W-78-06] N80-13127

DIRICHLET PROBLEM
Numerical solution of two-dimensional potential theory problems using integral equation techniques
N80-13835

DISCHARGE COEFFICIENT
Two-dimensional jet boundary interaction for submerged thermal discharges
N80-13390

DISCRETE ADDRESS BEACON SYSTEM
The Aircraft Reply and Interference Environment Simulator [ARIES]. Volume 3: Programmer's manual
[AD-A074424] N80-13017

DISCRETE FUNCTIONS
Duality theory, stochastic realization and invariant directions for linear discrete-time stochastic systems
N80-13858
Nonparametric families of life distributions. 1: Extreme points. Characteristics
N80-13859

DISKS [SHAPES]
Transient thermal effects in disc brakes
N80-13465

DISTANCE MEASURING EQUIPMENT
Establishment criteria for Distance Measurement Equipment [DME] with instrument landing system and/or localizer approach
[AD-A069818] N80-13016

DISTILLATION
Physical properties of gasoline/alcohol automotive fuels
[CONF-790520-4] N80-13273
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-33] N80-13287

DISTRIBUTED PARAMETER SYSTEMS
Processor and file allocation in distributed data base systems
N80-13787

DOMAINS
Domain and surface structures of sodium tungsten bronzes, Na/sub x/WO3 [0.4 x 1]
[AN!.-78-63] N80-13237

DOPED CRYSTALS
Chromium doped semi-insulating gallium arsenide grown by liquid phase epitaxy
N80-13949
Resistivity and hall coefficient measurements of iron doped niobium diselenide crystals
N80-13951

DOPPLER NAVIGATION
Satellite Doppler positioning in strengthening geodetic networks
N80-13015
Shuttle GPS R/PA configuration and specification study
[NASA-CR-160396] N80-13360

DOUBLE BASE ROCKET PROPELLANTS
Convective ignition of nitrocellulose based propellants in unsteady flow fields
[AD-A073546] N80-13271

DRAG MEASUREMENT
Pitot tube and drag body measurements in transient steam-water flows
[CONF-790505-15] N80-13416

DROPS [LIQUIDS]
Theoretical studies on heterogeneous combustion --- of liquid fuel droplets in sprays
[COO-4433-2] N80-13200

DRY HEAT
Hot dry rock geothermal energy development program
[LA-7807-HDR] N80-13673

DUCTED FLOW
High speed ejectors --- investigation of ejector performance in compressible flow
[AD-A073378] N80-13051

DUCTILITY
Strain hardening and ductility of iron: Axisymmetric vs. plane strain elongation
[COO-4072-2] N80-13234

DUMMIES
Evaluation of seating and restraint systems conducted during fiscal year 1978
[AD-A074881] N80-13014

DUST
Lidar observations at 0.7-micrometers and 10.6-micrometers wavelengths during dusty infrared test I [DIRT I]
[AD-A073330] N80-13340

DYNAMIC CHARACTERISTICS
A digital computer program for the dynamic interaction simulation of controls and structure [DISCOS]. Volume 4: Supplementary documentation
[NASA-TM-80546] N80-13150
Several aspects of dynamic behavior in nonlinear mathematical models of chemical reaction and diffusion
N80-13186
The shock and vibration digest, volume 11, number 3
[AD-A066514/1] N80-13298
Dynamic snap-through of shallow arches and spherical caps
N80-13299
Behavior of elastometric materials under dynamic loads, 2
N80-13312
Analysis techniques of experimental frequency response data
N80-13497
The self-organizing data base
N80-13788

DYNAMIC CONTROL
Analytical investigation of the landing dynamics of a large airplane with a load-control system in the main landing gear
[NASA-TP-1555] N80-13025

DYNAMIC LOADS
Behavior of elastometric materials under dynamic loads, 2
N80-13312
Method for describing nearly normal penetration of an ogive nosed penetrator into terrestrial targets
[SAND-79-0721] N80-13479
Optimal design of elastic structures for stability under multiple loads
N80-13504

DYNAMIC MODELS
A computerized VSTOL/small platform landing dynamics investigation model
[AD-A073587] N80-13033
Thermodynamics and dynamics of line phases
N80-13105
Contributions to Marangoni convection in cylindric melting zones: Experimental simulation and calculation of the influence of gravity
[BMFT-FB-W-78-39] N80-13421
An electric-current model of the magnetosphere
N80-13531

DYNAMIC RESPONSE
The shock and vibration digest, volume 11, number 6
[AD-A070464/3] N80-13499
Current methods for analyzing dynamic cable response --- vibration
N80-13500
Experiment and prediction in the bending of a nickel beam at 200 deg C
[COO-2733-21] N80-13519
A new method for the design of recursive digital filters and its fields of application
[ESA-TT-530-REV] N80-13930

DYNAMIC STABILITY
Experiments on the stability of conical and cylindrical liquid columns at low Bond numbers
N80-13110
High temperature damping of dynamic systems --- dynamic stability of turbines through high temperature vibration damping
N80-13308

DYNAMIC STRUCTURAL ANALYSIS
The use of strip theory in the dynamics of deformable aircraft
[RAE-TM-STRUCT-933] N80-13035
Design sensitivity analysis and optimization of constrained dynamic systems
N80-13470
Dynamic analysis of flexible mechanisms
N80-13502
Dynamic analysis of complex multi-level flexible rotor systems --- vibration calculations
N80-13509
Dynamic plastic buckling of shells: A reconsideration of the Vaughan-Florence analysis
[CONF-790802-1] N80-13518

E

EAI 600 COMPUTER
Evaluation of a simulation frame program for the EAI Pacer 600 hybrid-computer
[DFVLR-MITT-79-01] N80-13794

EARTH [PLANET]
The propagation of VLF waves through the interior of the Earth
[DRIC-TRANS-5572] N80-13345
The gravity field of the earth
[RAE-TR-78142] N80-13737

EARTH ATMOSPHERE
Earth and Jupiter: Comparison of magnetopause structure
N80-13560

EARTH CRUST
Crustal structure in areas of active crustal accretion
N80-13727
Average structure of the upper Earth mantle and crust between Albuquerque and the Nevada test site
[SAND-79-0975] N80-13732

EARTH MANTLE
Average structure of the upper Earth mantle and crust between Albuquerque and the Nevada test site
[SAND-79-0975] N80-13732

EARTH OBSERVATIONS [FROM SPACE]
Earth observations division Earth resources data analysis capabilities
[E80-10013] N80-13592

EARTH RESOURCES PROGRAM
Earth resources. A continuing bibliography with indexes, issue 23
[NASA-SP-7041[23]] N80-13585

EARTH SURFACE
SPOT, French preoperational remote sensing satellite system
N80-13610

EARTH TIDES
Satellite contributions to tidal studies
[TUM-MITT-147] N80-13583

EARTHQUAKES
Development of in situ marine seismic and geotechnical instrumentation systems
[SAND-79-0868C] N80-13431
In situ stress field in the southeastern United States and its implication
[DP-MS-78-95] N80-13733
Review of earthquake vibratory ground motion intensity attenuation relationships
[SAN-1011/119] N80-13734

ECONOMETRICS
Survey of the research into energy-economy interactions. Volume 1: Survey
[HCP/16346-01-1-VOL-1] N80-13633

ECONOMIC ANALYSIS
Multi-year plan for thermal and mechanical energy storage program
[DOE/ET-0109] N80-13658
Assessment of technical and economic feasibility of zinc/bromine batteries for utility load leveling
[EPRI-EM-1059] N80-13659
Economic study of multipurpose advanced high-speed transport configurations
[NASA-CR-159126] N80-13986
A technical and economic evaluation of the project in Baltimore, Maryland, volume 2 --- waste processing plant
[PB-297871/6] N80-13991
A technical and economic evaluation of the project in Baltimore, Maryland, Volume 3 --- waste processing plant
[PB-297872/4] N80-13992
A technical and economic evaluation of the project in Baltimore, Maryland, volume 4 --- waste processing plant
[PB-297873/2] N80-13993

ECONOMIC FACTORS
Survey of the research into energy-economy interactions. Volume 1: Survey
[HCP/16346-01-1-VOL-1] N80-13633
Fundamental economic issues in the development of small-scale hydro
[DOE/RA-23-216.00.0-02] N80-13667

ECONOMICS
Newton's method for generalized equations and the PIES energy model
N80-13872
ECOSYSTEMS
Wetland values concepts and methods wetlands evaluation
[AD-A069088] N80-13602
EDEMA
Resuscitation from hypothermia: A literature review
[AD-A069093] N80-13764
EDGE DISLOCATIONS
Dynamic edge dislocation displacements and Peierls strains in a linear elastic strip
[UCRL-52787] N80-13523
EFFICIENCY
An investigation of the efficiency of regenerative blowers and pumps
N80-13463
EIGENVALUES
Phase measurements of fast wave toroidal eigenmodes --- resonant frequencies
N80-13931
EJECTORS
High speed ejectors --- investigation of ejector performance in compressible flow
[AD-A073378] N80-13051
ELASTIC BUCKLING
Optimal design of elastic structures for stability under multiple loads
N80-13504
ELASTIC DAMPING
On the problem of spring loaded resistance to simple and complex positioning of a control stick --- in manual control experiments
[FB-40] N80-13778
ELASTIC DEFORMATION
The use of strip theory in the dynamics of deformable aircraft
[RAE-TM-STRUCT-933] N80-13035
The equations of motion of an aircraft embracing its whole-body and deformational degrees of freedom
[RAE-TR-79010] N80-13037
A suggestion as to a general derivation of the equations of motion of a deformable aircraft for small perturbations which will be most generally acceptable
[RAE-TR-79011] N80-13038
Dynamic analysis of flexible mechanisms
N80-13502
Dynamic edge dislocation displacements and Peierls strains in a linear elastic strip
[UCRL-52787] N80-13523
ELASTIC MEDIA
A theory of viscoelastic analogy for wave propagation in elastic and viscoelastic layered media
N80-13392
ELASTIC PLATES
Analysis of surface cracks in finite plates under tension or bending loads
[NASA-TP-1578] N80-13512
ELASTIC PROPERTIES
Identification of the elastic constants for composites using modal analysis
[SAND-79-0527C] N80-13176
Elongation upon torsion in a theory for the inelastic behavior of metals
[COO-2733-1] N80-13231
ELASTIC SCATTERING
Elastic electron scattering at large momentum transfer
[SLAC-PUB-2334] N80-13903
Polarization parameter measurement for K+p elastic scattering below 1 Ge/V/c
N80-13959
ELASTIC WAVES
Elastodynamic diffraction and radiation problems
N80-13505
ELASTODYNAMICS
Elastodynamic diffraction and radiation problems
N80-13505
ELASTOMERS
Improved bondability to RTV silicone elastomer using rf-activated gas
[BDX-613-2157] N80-13260
Behavior of elastometric materials under dynamic loads, 2
N80-13312
ELASTOPLASTICITY
Elastic plastic analysis of growing cracks
[COO-3084-65] N80-13517
ELECTRIC AUTOMOBILES
Engineering development of lithium/metal sulfide battery technology for vehicle propulsion
[ANL-79-1] N80-13685
ELECTRIC BATTERIES
Distribution and movement of electrolyte in fuel cells and batteries
N80-13619
Heat transfer in lead-acid batteries
[CONF-7809102-1] N80-13641
Development of porous sintered-ceramic separators for application in a Li-Al/LiCl-KCl/FeS battery
[CONF-790526-2] N80-13683
Engineering development of lithium/metal sulfide battery technology for vehicle propulsion
[ANL-79-1] N80-13685
ELECTRIC BRIDGES
An explicit state model of a synchronous machine - transformer - SCR bridge unit
N80-13357
Heterodyne detection and generation of microwave radiation by superconducting microbridges in a resonant structure
N80-13954
ELECTRIC CONDUCTORS
Experimental methods for the characterization of multiconductor cable systems
[AD-A073767] N80-13366
Quasi-static electric field build-up between two spherical conductors
[UCID-18236] N80-13372
ELECTRIC CORONA
Corona-discharge treatment of polymeric films. 2: Chemical studies
[UCRL-52709] N80-13263
ELECTRIC CURRENT
Theoretical and experimental studies of periodic currents and potentials in electroplating and in fast kinetics on a rotating disk electrode
N80-13350
Fast opening switches carrying multimegampere currents and their application to high velocity shock waves in xenon
[UCRL-82134] N80-13385
ELECTRIC ENERGY STORAGE
Assessment of technical and economic feasibility of zinc/bromine batteries for utility load leveling
[EPRI-EM-1059] N80-13659
ELECTRIC FIELD STRENGTH
Quasistatic electric fields observed during a number of magnetopause crossings by ISEE-1
N80-13535
ELECTRIC FIELDS
Quasi-static electric field build-up between two spherical conductors
[UCID-18236] N80-13372
ELECTRIC HYBRID VEHICLES
Performance of 22.4-kW nonlaminated-frame dc series motor with chopper controller --- a dc to dc voltage converter
[NASA-TM-79252] N80-13361
ELECTRIC MOTOR VEHICLES
Performance of 22.4-kW nonlaminated-frame dc series motor with chopper controller --- a dc to dc voltage converter
[NASA-TM-79252] N80-13361
ELECTRIC MOTORS
Performance of 22.4-kW nonlaminated-frame dc series motor with chopper controller --- a dc to dc voltage converter
[NASA-TM-79252] N80-13361
The influence of ceramic permanent magnets on the armature of a small potential dc motor
[REPT-1631] N80-13386
ELECTRIC NETWORKS
Stochastic intergration using random point processes
N80-13860
ELECTRIC POTENTIAL
Theoretical and experimental studies of periodic currents and potentials in electroplating and in fast kinetics on a rotating disk electrode
N80-13350
Analysis of the anode boundary layer of a high pressure-high current arc
N80-13358
IVFOR: A user oriented program characterizing the current-voltage properties of a two terminal device
[SAND-79-0972] N80-13373
ELECTRIC POWER
Systems engineering for power, program report
[DOE/ET-0012/2-REV] N80-13637
ELECTRIC POWER PLANTS
Requirements assessment of wind power plants in electric utility systems. Volume 3: Appendixes
[EPRI-ER-978-VOL-3] N80-13628
OTEC platform configuration and integration, appendixes to volume 2
[DOE/ET-4065/1-VOL-2-APP] N80-13713
OTEC platform configuration and integation. Volume 3: Project plan
[DOE/ET-4065/1-VOL-3] N80-13714
Remote systems requirements of the High Yield Lithium Injection Fusion Energy [HYLIFE] converter concept --- systems engineering of remote sensors for inspection of fusion reactor electric power plant
[UCRL-81309] N80-13908
ELECTRIC POWER TRANSMISSION
Development of an electrical load demand and response model based on a rational synthesis from elementary devices
[DOE/ET-5109/1] N80-13371
ELECTRIC PROPULSION
Primary electric propulsion technology study --- for thruster wear-out mechanisms
[NASA-CR-159688] N80-13158
ELECTRIC PULSES
Design and analysis of transient high voltage electrical devices: Ozone production in fast pulsed dielectric barrier discharges in oxygen and modeling of an intense relativistic electron beam source
N80-13890
ELECTRIC SWITCHES
Shock-induced electrical switching in polymeric films
[CONF-790540-11] N80-13264
Fast opening switches carrying multimegampere currents and their application to high velocity shock waves in xenon
[UCRL-82134] N80-13385
ELECTRIC WIRE
A filamentary multipole model for cylindrical antennas
N80-13320
Superconducting properties of [Nb,Ta]3Sn wires fabricated by the bronze process
[BNL-26391] N80-13383
ELECTRICAL FAULTS
Fault test generation for sequential circuits: A search directing heuristic
N80-13353
ELECTRICAL IMPEDANCE
Latch-up control in CMOS integrated circuits
[SAND-79-0646C] N80-13382
ELECTRICAL INSULATION
Corrosion control of Hardened Intersite Cable System [HICS] splice case
[AD-A073431] N80-13219
Study of the physics of insulating films as related to the reliability of metal-oxide semiconductor devices
[AD-A073300] N80-13364
ELECTRICAL PROPERTIES
Structural and physical characteristics of InSb single crystals grown under near-zero gravity conditions
N80-13071
Measurement of the electrical properties of composite materials in the frequency range of DC to 30 MHz
[AD-A073638] N80-13175
Lead zirconate titanate [LZT] ceramics
[AD-A073564] N80-13259
Ceramic capacitors: A comparative investigation of the quality and stability of 23 manufactures and types, including disc, plate and multilayer capacitors
[ECR-87] N80-13387
ELECTRICAL RESISTIVITY
A new thermal conductivity apparatus for small conducting specimens and measurememts on niobium monoxide --- measuring thermal conductivity, electrical resistivity, and thermoelectric power
N80-13428
Resistivity and hall coefficient measurements of iron doped niobium diselenide crystals
N80-13951
ELECTRICITY
Cogeneration opportunities --- conferences
[CONF-7806118] N80-13681
ELECTROCHEMICAL CELLS
Multi-year plan for thermal and mechanical energy storage program
[DOE/ET-0109] N80-13658
ELECTROCHEMISTRY
Scanning reference electrode techniques in localized corrosion
[BNL-26094] N80-13238
Corona-discharge treatment of polymeric films. 2: Chemical studies
[UCRL-82709] N80-13263
ELECTRODEPOSITION
Low cost solar cells based on amorphous silicon electrodeposited from organic solvents
[SAN-0113-T3] N80-13678
Formation and coalescence of epitaxial crystallites in nickel electrodepositon in air and argon atmospheres
N80-13947
ELECTRODES
Scanning reference electrode techniques in localized corrosion
[BNL-26094] N80-13238
Theoretical and experimental studies of periodic currents and potentials in electroplating and in fast kinetics on a rotating disk electrode
N80-13350
ELECTROLYTES
Distribution and movement of electrolyte in fuel cells and batteries
N80-13619
Heat transfer in lead-acid batteries
[CONF-7809102-1] N80-13641
ELECTROMAGNETIC COMPATIBILITY
Measurement of the electrical properties of composite materials in the frequency range of DC to 30 MHz
[AD-A073638] N80-13175
ELECTROMAGNETIC FIELDS
Efficient numerical procedure for modeling antennas over lossy Earth
[UCRL-82121] N80-13341
ELECTROMAGNETIC PROPERTIES
Electromagnetic lower hybrid instabilities in an inhomogeneous plasma
N80-13934
ELECTROMAGNETIC PULSES
Experimental methods for the characterization of multiconductor cable systems
[AD-A073767] N80-13366
ELECTROMAGNETIC RADIATION
Stimulated Thomson scattering
N80-13330

ELECTROMAGNETIC SURFACE WAVES
Surface-wave scattering by dielectric gratings with arbitrary profiles
N80-13964
ELECTROMAGNETIC WAVE TRANSMISSION
Feasibility study for Spacelab user program: Propagation of electromagnetic waves
[BMFT-FB-W-78-10] N80-13344
ELECTROMAGNETISM
Electromagnetic structure of the magnetopause and boundary layer
N80-13581
ELECTROMECHANICAL DEVICES
Flight Technology Improvement --- spaceborne optical radiometric instruments, attitude control, and electromechanical and power subsystems
[NASA-CP-2101] N80-13152
Summary of the Flight Technology Improvement Workshop --- spaceborne optical radiometric instruments, attitude control, and electromechanical and power subsystems
N80-13153
Report of the Electromechanical Subsystems Panel --- spaceborne instrumentation technology
N80-13155
ELECTRON BEAM WELDING
Development of automated welding processes for field fabrication of thick-walled pressure vessels: Electron beam method
[DOE/ET-2606/4] N80-13476
Development of automated welding processes for field fabrication of thick-walled pressure vessels: Electron beam method
[FE-2606-5] N80-13484
ELECTRON BEAMS
Experimental investigation of the local density and temperature distribution in the flow field around a sphere with high thermodynamic nonequilibrium using the electron beam technique
[ESA-TT-516-REV] N80-13012
A low energy electron magnetometer
[NASA-TM-80172] N80-13429
Data acquisition system for the Hamilton Standard W2 electron beam welder
[SAND-79-8014] N80-13482
Energy and spectrum measurements of high energy electrons beams using a Cerenkov detector
N80-13898
Generation and control of a slow space charge wave on a high current electron beam and its potential as a collective ion accelerator
N80-13900
ELECTRON DENSITY PROFILES
Variations of electron and ion distributions during dayside magnetopause crossings of GEOS-2
N80-13548
ELECTRON ENERGY
A low energy electron magnetometer
[NASA-TM-80172] N80-13429
Electron characteristics in the solar wind as deduced from Helios observations
N80-14012
ELECTRON IRRADIATION
Effect of electron irradiation on the strength of niobium single crystals
N80-13961
ELECTRON MICROSCOPES
Optimization of an analytical electron microscope for X-ray microanalysis: Instrumental problems
[CONF-790418-6] N80-13432
ELECTRON MICROSCOPY
Electronmicroscopic study of sand erosion processes in metals
[AD-A073497] N80-13220
Analytical electron microscope study of the omega phase transformation in a zirconium-nobium alloy
[ORNL/TM-6705] N80-13240
ELECTRON PARAMAGNETIC RESONANCE
Magnetic resonance studies of epoxy resins and polyurethanes
[AD-A073590] N80-13173
ELECTRON SCATTERING
New methods for quantum mechanical calculations of inelastic atom-molecule collisions and electron scattering
N80-13892
Elastic electron scattering at large momentum transfer
[SLAC-PUB-2334] N80-13903
ELECTRON SPECTROSCOPY
Inelastic electron tunneling spectroscopy of ring compounds on alumina
N80-13957
ELECTRON TRANSITIONS
Dual photoconductivity effects induced by the intersubband transitions in n-type silicon inversion layers
N80-13962
Transient phenomena in electron transport in semiconductors
[AD-A073009] N80-13966
Absence of crystalline order in two-dimensions --- thermodynamic study of electron transitions in crystal structure for crystalline order
[AD-A073672] N80-13968
ELECTRON TUNNELING
Inelastic electron tunneling spectroscopy of ring compounds on alumina
N80-13957
Experimental investigation of the absolute tunneling current density in field emission from tungsten [110]
N80-13963
ELECTRONIC EQUIPMENT TESTS
Design and testing of high performance brushes
[AD-A073593] N80-13367
ELECTRONIC MODULES
Fault test generation for sequential circuits: A search directing heuristic
N80-13353
ELECTRONIC PACKAGING
Design, processing and testing of LSI arrays, hybrid microelectronics task
[NASA-CR-161337] N80-13359
ELECTRONIC RECORDING SYSTEMS
User's handbook for GT8 galvanometer drive amplifier system
[OUEL-1284/79] N80-13436
ELECTRONS
Energetic electron bursts in the magnetopause electron layer and in interplanetary space
N80-13544
STARE ionospheric electron flows during the August 28, 1978 GEOS-2 magnetopause crossing
N80-13552
ELECTROPHORESIS
Sample stream distortion modeled in continuous-flow electrophoresis
[NASA-TM-78178] N80-13192
ELECTROPLATING
Theoretical and experimental studies of periodic currents and potentials in electroplating and in fast kinetics on a rotating disk electrode
N80-13350
ELECTROSTATIC WAVES
Low frequency waves and irregularities in the low altitude boundary layer
N80-13557
ELEVONS
Investigation of high frequency oscillations in the OV102 elevon actuation subsystems using continuous system modeling program simulation
[NASA-CR-160407] N80-13151
ELLIPTIC FUNCTIONS
Invariant tests for scale parameters under elliptical symmetry
N80-13855
ELONGATION
Elongation upon torsion in a theory for the inelastic behavior of metals
[COO-2733-1] N80-13231
Strain hardening and ductility of iron: Axisymmetric vs. plane strain elongation
[COO-4072-2] N80-13234
EMISSION
Laser-induced emission from uranium-hexa-fluoride
N80-13893
EMISSION SPECTRA
Spectral emission of nuclear excited XeBr*
N80-13443
Laser-induced emission from uranium-hexa-fluoride
N80-13893
ENERGETIC PARTICLES
Ion and electron layers at the magnetopause: ISEE-2
N80-13545
Particle and field characteristics of the dayside magnetopause energetic electron layer
N80-13546
Variations of electron and ion distributions during dayside magnetopause crossings of GEOS-2
N80-13548
ENERGY ABSORPTION FILMS
Novel concentrator photovoltaic converter system development
[SAND-79-7040] N80-13661
ENERGY BUDGETS
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597
Beauce TELLUS project --- France
[E80-10024] N80-13600
ENERGY CONSERVATION
Energy planning with solar and conservations: Individual values and community choice
[LA-UR-79-1599] N80-13653
Energy conservation via heat transfer enhancement
[COO-4649-4] N80-13707
ENERGY CONVERSION
Commercialization task force for high Btu gasification
[TID-28849] N80-13286
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-30] N80-13291
Synfuel [hydrogen] production from fusion power
[LA-UR-79-1115] N80-13296
Oxygen electrodes for energy conversion, storage, and conservation: Investigation of simple and mixed oxides
N80-13620
Analysis of binary thermodynamic cycles for a moderately low-temperature geothermal resource
[TREE-1365] N80-13627
Solar thermal electric plants in hydroelectric grid --- Lower Colorado region
[DOE/SF/10505-1] N80-13663
Conceptual designs for two reject heat systems for a Brayton closed-cycle converter
[LA-7821-MS] N80-13677
Fossil energy program. 1. Mining research and development: Coal preparation and analysis
[IS-4655] N80-13679
Critical review and assessment of environmental and safety problems in hydrogen energy systems
[LA-7820-PR] N80-13690
Environmental development plan: Wind energy conversion
[DOE/EDP-0030] N80-13701
ENERGY CONVERSION EFFICIENCY
Experimental study of heat transfer from a yawed cylinder to air with a constant wall heat flux
[SAND-79-8022] N80-13005
Driving cycle comparisons of energy economies and emissions from an alcohol and gasoline fueled vehicle
[CONF-790520-7] N80-13274
Classification and technical review of dc-ac inverters for use in photovoltaic power systems
[COO-4094-25] N80-13377
Nuclear-Pumped Lasers --- efficient conversion of energy liberated in nuclear reactions to coherent radiation
[NASA-CP-2107] N80-13438
Theoretical analysis of multi-cell, high efficiency broad spectral sensitivity solar cells
N80-13617
Novel concentrator photovoltaic converter system development
[SAND-79-7040] N80-13661
Evaluation of combined photovoltaic/thermal collectors
[COO-4577-8] N80-13665
Materials for solar thermal conversion
[COO-4557-1] N80-13670
ENERGY DISSIPATION
A study of the dissipative mechanism in the flow of superfluid helium-4 using charged vortex rings
N80-13314
Energy saving in injection molding
[NEL-662] N80-13318
Relation of ultrasonic energy loss factors and constituent properties in unidirectional composites --- graphite-epoxy composite materials
[NASA-CR-3181] N80-13878
ENERGY POLICY
Environmental analysis of synthetic liquid fuels --- shale oil, coal liquefaction, and biomass production of ethanol
[DOE/EV-0044] N80-13279
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels [riser cracking of coal]
[FE-2307-46] N80-13280
Commercialization strategy report for coal liquefaction
[TID-28846] N80-13285
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-33] N80-13287
Underground coal conversion. Program description
[DOE/ET-0100] N80-13293
Review of supporting research at Oak Ridge National Laboratory for underground coal conversion
[CONF-790630-9] N80-13295
Liquid hydrogen as an automotive fuel
[LA-UR-79-621] N80-13297
Energy saving in injection molding
[NEL-662] N80-13318
Condensation and evaporation heat transfer with low-boiling temperature fluids --- for ocean thermal and geothermal energy conversion
[CONF-790539-1] N80-13412
Geopressure energy resource evaluation --- Texas and Louisiana
[ORNL/PPA-79/2] N80-13605
Current U. S. petroleum situation and short-term supply/demand outlook
[DOE/EIA-0184/5] N80-13607
World Energy Data System [WENDS]. Volume 7: Nuclear facility profiles, AG-CH
[ANL-PMS-79-2-VOL-7] N80-13629
Low-temperature thermal energy storage program annual operating plan
[ORNL/TM-6934] N80-13631
Survey of the research into energy-economy interactions. Volume 1: Survey
[HCP/I6346-01-1-VOL-1] N80-13633
Energy policy and decision analysis; new concepts and mechanisms
[LA-7909-MS] N80-13634
Systems engineering for power, program report
[DOE/ET-0012/2-REV] N80-13637
Energy system in the Far West: Impacts of the National Energy Act of 1978
[UCRL-52754] N80-13638
Solar thermal test facility heliostat development
[SAND-78-1177] N80-13642

National energy policy and state coastal programs: A critique of current efforts to balance environmental protection and energy production along the coast
[SAN-0034/263-1] N80-13643
Linear concentration solar collector in an air supported enclosure. Preliminary design study
[SAND-78-7022] N80-13644
Performance testing of the General Electric Engineering Prototype Collector
[SAND-79-0514] N80-13645
Characterization of solid-waste conversion and cogeneration systems
[LBL-7883] N80-13648
Review of the environment effects and benefits of selected solar energy technologies
[SERI/TP-53-114R] N80-13649
Process optimization of industrial energy use
[BNL-26482] N80-13650
Case study of the Brownell low energy requirement house
[BNL-50968] N80-13651
Design, construction, and operation of the solar assisted heat pump ground coupled storage experiments at Brookhaven National Laboratory
[BNL-25908] N80-13654
OTEC platform configuration and integration. Volume 1: Systems engineering and integration
[TID-29418] N80-13655
OTEC thermal response report for Pacific plant ship, 5 to 10 deg N 90 to 95 deg W
[HCP/T2898-01/3] N80-13656
Solar thermal power systems
[DOE/ET-0078/T1] N80-13662
Solar thermal electric plants in hydroelectric grid --- Lower Colorado region
[DOE/SF/10505-1] N80-13663
Fundamental economic issues in the development of small-scale hydro
[DOE/RA-23-216.00.0-02] N80-13667
Solar cooling performance in CSU Solar House 3
[COO-2858-23] N80-13668
Experimental and theoretical evaluation of a novel concentrating solar energy collection system
[SAND-79-1053C] N80-13671
Trans-seasonal storage of solar energy: Innovative research program subtask --- underground storage
[COO-4546-3] N80-13672
Hot dry rock geothermal energy development program
[LA-7807-HDR] N80-13673
Low cost solar cells based on amorphous silicon electrodeposited from organic solvents
[SAN-0113-T3] N80-13678
Fossil energy program. 1. Mining research and development: Coal preparation and analysis
[IS-4655] N80-13679
Thermal performance of buildings and building envelope systems: An annotated bibliography
[LBL-8925] N80-13680
Cogeneration opportunities --- conferences
[CONF-7806118] N80-13681
Cost analysis of packed beds for thermal energy storage
[CAES-11] N80-13687
Status of development, energy and economics aspects of alternative technologies --- energy policy and technology with respect to coal utilization
[CONF-790371-1] N80-13689
Sandia Laboratories operational experience with small heat engines in solar thermal power systems
[SAND-78-2163C] N80-13693
OTEC power systems
[CONF-790444-2] N80-13696
Silicon concentrator solar cell manufacturing development
[SAND-79-7021] N80-13697
Review of solar energy
[SERI/TR-54-066] N80-13699
Solar central receiver prototype heliostat CDRL item B.D., volume 1
[SAN-1605/7-VOL-1] N80-13700
Fossil energy program, 1. Mining research and development: Coal preparation and analysis
[IS-4703] N80-13702
Solar heating and cooling research projects: A summary
[EPRI-ER-1095-SR] N80-13703
Community heating and cooling systems
[CONF-790446-6] N80-13706
Energy conservation via heat transfer enhancement
[COO-4649-4] N80-13707
Industrial applications of advanced energy systems
[CONF-790602-54] N80-13708
OTEC platform configuration and integration, executive summary
[DOE/ET-4065/1] N80-13711
OTEC platform configuration and integration, appendixes to volume 2
[DOE/ET-4065/1-VOL-2-APP] N80-13713
OTEC platform configuration and integation. Volume 3: Project plan
[DOE/ET-4065/1-VOL-3] N80-13714
Critique of the meteorological and air quality baseline monitoring program for the prototype oil shale leaseholds. Part A: Comments on the approach taken and recommendations for continuing program. Part B: Comments on the data acquisition and management
[DOE/EV-70031/4-PT-A/B] N80-13723
The analysis of sediment samples for hydrocarbons
[AD-A073822] N80-13754
Newton's method for generalized equations and the PIES energy model
N80-13872
US program for the immobilization of high-level nuclear wastes
[DP-MS-79-2] N80-13917
Fusion power program
[ANL/FPP-78-4] N80-13941

ENERGY REQUIREMENTS

Case study of the Brownell low energy requirement house
[BNL-50968] N80-13651
Analysis of metabolic energy utilization in the Skylab astronauts
[NASA-CR-160402] N80-13770

ENERGY SOURCES

Nuclear-pumped CO2 laser
N80-13440

ENERGY STORAGE

Transient thermal analysis of phase change material energy storage system
N80-13618
Oxygen electrodes for energy conversion, storage, and conservation: Investigation of simple and mixed oxides
N80-13620
Hydrogen-halogen energy storage system
[BNL-50924] N80-13632
Multi-year plan for thermal and mechanical energy storage program
[DOE/ET-0109] N80-13658
Large-scale annual-cycle thermal energy storage in aquifers
[CONF-790515-3] N80-13686

ENERGY TECHNOLOGY

Biological transformation of light energy into methane using an anaerobic filter
N80-13267
Gas generator research and development: BI-GAS process
[FE-1207-62] N80-13288
Methane recovery from coalbeds project. Technology test projects: Evaluation of candidate projects
[METC-8089-T4] N80-13290
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-30] N80-13291
Catalyst development for coal liquefaction
[EPRI-AF-1084] N80-13292
Modified aerospace reliability and quality assurance method for wind turbines
[NASA-TM-79284] N80-13490
Summaries of physical research in the geosciences
[DOE/ER-0030] N80-13582
Requirements assessment of wind power plants in electric utility systems. Volume 3: Appendixes
[EPRI-ER-978-VOL-3] N80-13628
Assessment of Stirling engine potential in total and integrated energy systems
[ANL/ES-76] N80-13636
Integral cell scale-up and performance verification
[EPRI-EM-1134] N80-13646
Review of the environment effects and benefits of selected solar energy technologies
[SERI/TP-53-114R] N80-13649
Solar thermal power systems
[DOE/ET-0078/T1] N80-13662
Experimental and analytical OTEC studies at ORNL
[CONF-790631-1] N80-13666
Technology development needs for high temperature process heat
[SERI/TR-35-047] N80-13669
Experimental and theoretical evaluation of a novel concentrating solar energy collection system
[SAND-79-1053C] N80-13671
Hot dry rock geothermal energy development program
[LA-7807-HDR] N80-13673
Wind energy innovative systems
[SERI/PR-13-054] N80-13674
Fossil energy program. 1. Mining research and development: Coal preparation and analysis
[IS-4655] N80-13679
Cogeneration opportunities --- conferences
[CONF-7806118] N80-13681
Photovoltaic concentrator application experiment. Phase 1: A 150 kW photovoltaic concentrator power system for load-center applications with feedback into the utility grid
[DOE/CS-34267/1] N80-13688
Status of development, energy and economics aspects of alternative technologies --- energy policy and technology with respect to coal utilization
[CONF-790371-1] N80-13689
OTEC power systems
[CONF-790444-2] N80-13696
Review of solar energy
[SERI/TR-54-066] N80-13699
Environmental development plan: Wind energy conversion
[DOE/EDP-0030] N80-13701
Thin film problems and research in energy systems
[CONF-761168-SUMM] N80-13705
Energy conservation via heat transfer enhancement
[COO-4649-4] N80-13707
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0816/3] N80-13717
Geothermal energy, volume 3. Citations from the Engineering Index data base
[NTIS/PS-79/0818/9] N80-13718
Geothermal energy, volume 4. Citations from the Engineering Index data base
[NTIS/PS-79/0819/7] N80-13720

ENERGY TRANSFER

Rates of mass, momentum, and energy transfer at the magnetopause
N80-13571
Relativistic electron bean energy deposition in thin gold and aluminum targets
[SAND-78-2026] N80-13901
Solution of the initial value problem and energy redistribution for electron and Alfven waves in inhomogeneous plasmas
[REPT-78-115] N80-13945

ENGINE ANALYZERS

Computer code for estimating installed performance of aircraft gas turbine engines. Volume 1: Final report
[NASA-CR-159691] N80-13043
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 2: Users manual
[NASA-CR-159692] N80-13044
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 3: Library of maps
[NASA-CR-159693] N80-13045

ENGINE DESIGN

Orbital Transfer Vehicle [OTV] engine study. Phase A: Extension
[NASA-CR-161338] N80-13160

ENGINE INLETS

Evaluation of airjet distortion generator used to produce steady-state, total-pressure distortion at the inlet of a General Electric F101-GE-100 turbofan engine
[AD-A072743] N80-13049

ENGINE NOISE

A review of the research at NGTE concerning the effects of flight on engine exhaust noise
[NGTE-R-78007] N80-13887

ENGINE PARTS

Build 2 of an accelerated mission test of a TF-41 with block 76 hardware --- investigation of structural reliability of engine parts of a turbofan engine
[AD-A073436] N80-13050
Hg ion thruster component testing
[NASA-TM-79287] N80-13159

ENGINE TESTING LABORATORIES

Orbital Transfer Vehicle [OTV] engine study. Phase A: Extension
[NASA-CR-161338] N80-13160

ENGINE TESTS

Computer code for estimating installed performance of aircraft gas turbine engines. Volume 1: Final report
[NASA-CR-159691] N80-13043
Build 2 of an accelerated mission test of a TF-41 with block 76 hardware --- investigation of structural reliability of engine parts of a turbofan engine
[AD-A073436] N80-13050
Hg ion thruster component testing
[NASA-TM-79287] N80-13159
Experimental investigation of a solid fuel ramjet
[DFVLR-FB-78-27] N80-13485
Hydride engines
[SAND-78-2303C] N80-13709

ENGLAND

The estimation of soil moisture content and actual evapotranspiration using thermal infra-red remote sensing --- Buckinghamshire, England
[E80-10021] N80-13599

ENTHALPY

Determination of the vacancy formation enthalpy for high purity Ni
[BNL-26191] N80-13971

ENVIRONMENT EFFECTS

Environmental analysis of synthetic liquid fuels --- shale oil, coal liquefaction, and biomass production of ethanol
[DOE/EV-0044] N80-13279
Preparation of a coal conversion systems technical data book, project 61003
[FE-2286-32] N80-13281
Review of the environment effects and benefits of selected solar energy technologies
[SERI/TP-53-114R] N80-13649
Critical review and assessment of environmental and safety problems in hydrogen energy systems
[LA-7820-PR] N80-13690
Environmental development plan: Wind energy conversion
[DOE/EDP-0030] N80-13701
Critique of the meteorological and air quality baseline monitoring program for the prototype oil shale leaseholds. Part A: Comments on the approach taken and recommendations for continuing program. Part B: Comments on the data acquisition and management
[DOE/EV-70031/4-PT-A/B] N80-13723
Evaluation of the proposed WIPP site in Southeast New Mexico --- waste isolation pilot plant
[SAND-79-1113C] N80-13909

ENVIRONMENT MANAGEMENT
Remote sensing applied to environmental pollution detection and management. A bibliography with abstracts
[NTIS/PS-79/0842/9] N80-13614
ENVIRONMENT PROTECTION
Wetland values concepts and methods wetlands evaluation
[AD-A069088] N80-13602
National energy policy and state coastal programs: A critique of current efforts to balance environmental protection and energy production along the coast
[SAN-0034/263-1] N80-13643
ENVIRONMENT SIMULATORS
The Aircraft Reply and Interference Environment Simulator [ARIES]. Volume 3: Programmer's manual
[AD-A074424] N80-13017
A field of view simulator equipped for perspective transformation on a television raster
[FB-34] N80-13775
ENVIRONMENTAL CONTROL
Controlling the clean room atmosphere
[GEPP-OP-405] N80-13138
ENVIRONMENTAL MONITORING
The Geoscientific Airborne Remote Sensing Program
[BMFT-FB-W-78-31] N80-13608
Instrumentation for environmental monitoring
[LBL-9323] N80-13722
Guidelines for multimedia environmental monitoring of Department of Energy fossil energy RD and D facilities
[FE-2495-T13-VOL-2] N80-13724
ENVIRONMENTAL TESTS
Effect of phase instabilities on the correlation of nickel ion and neutron irradiation swelling in solution annealed 316 stainless steel
[CONF-790657-2] N80-13226
Ceramic capacitors: A comparative investigation of the quality and stability of 23 manufactures and types, including disc, plate and multilayer capacitors
[ECR-87] N80-13387
Method for accelerated aging under combined environmental stress conditions
[SAND-79-0930C] N80-13494
EPITAXY
Formation and coalescence of epitaxial crystallites in nickel electrodepositon in air and argon atmospheres
N80-13947
Initial epitaxy and interdiffusion phenomena in Au-Cu bilayers --- microstructure
N80-13948
Chromium doped semi-insulating gallium arsenide grown by liquid phase epitaxy
N80-13949
Epitaxy and misfit dislocations in large misfit systems
[CONF-790442-17] N80-13972
Epitaxy at reduced temperatures
[BMFT-FB-T-78-52] N80-13980
EPOXY RESINS
Magnetic resonance studies of epoxy resins and polyurethanes
[AD-A073590] N80-13173
A correlation between morphology and fracture properties of epoxy resins
N80-13248
EQUATIONS OF MOTION
Formulation of the equations of motion of a deformable aircraft using Lagrange's equations in an arbitrary non-inertial frame of reference
[RAE-TM-STRUCT-941] N80-13036
The equations of motion of an aircraft embracing its whole-body and deformational degrees of freedom
[RAE-TR-79010] N80-13037
A suggestion as to a general derivation of the equations of motion of a deformable aircraft for small perturbations which will be most generally acceptable
[RAE-TR-79011] N80-13038
Molecular application to the equations of motions method
N80-13891
EQUATIONS OF STATE
Photonic compression --- laser fusion to measure high pressure equations of state
[LA-UR-79-2040] N80-13973
EQUATORIAL ELECTROJET
Nonlinear simulation of type 1 irregularities in the equatorial electrojet
N80-13397
EQUILIBRIUM EQUATIONS
Thermodynamics and dynamics of line phases
N80-13105
EQUIPMENT SPECIFICATIONS
Guidelines for mission integration, a summary report
[NASA-CR-161347] N80-13067
Skylark sounding rocket facilities for materials science experiments
N80-13121
Ceramic capacitors: A comparative investigation of the quality and stability of 23 manufactures and types, including disc, plate and multilayer capacitors
[ECR-87] N80-13387
EQUIVALENCE
Equivalence principle as applied to conical arrays
[AD-A073384] N80-13335
EREP
Earth resources. A continuing bibliography with indexes, issue 23
[NASA-SP-7041[23]] N80-13585
EROSION
Electronmicroscopic study of sand erosion processes in metals
[AD-A073497] N80-13220
Scattering of ultrasonic waves by periodically roughened surfaces --- detection of surface erosion
[CONF-790505-17] N80-13884
ERROR ANALYSIS
Star tracker error analysis: Roll-to-pitch nonorthogonality
[NASA-TM-80835] N80-13134
Positional error analysis, A-10 aircraft on three-axis ground mount
[AD-A073600] N80-13336
Error performance of differentially coherent detection of binary DPSK data transmission on the hard-limiting satellite channel
[AD-A073377] N80-13337
Detection and MMSE estimation of nonlinear memoryless functionals of random processes using the Volterra functional expansion
N80-13355
Instrument error analysis as it applies to wind-tunnel testing
[NASA-TP-1572] N80-13430
Skylab water balance error analysis
[NASA-CR-160403] N80-13771
Computational experiments on two error estimation procedures for ordinary differential equations
[AD-A073768] N80-13844
ERROR CORRECTING DEVICES
Atmospheric correction of surface temperature measurements in a 10.5 to 12.5 micron channel from AVHRR/TIROS-N
N80-13739
ERROR FUNCTIONS
The superposition of two-dimensional error fields and its influence on flight safety of air traffic
[ESA-TT-527-REV] N80-13022
ERYTHROCYTES
System parameters for erythropoiesis control model: Comparison of normal values in human and mouse model
[NASA-CR-160401] N80-13759
ETCHING
Industrial capability to chem-mill aluminum alloy 2219 in T-37 and T-87
[NASA-CR-161349] N80-13316
ETHYL ALCOHOL
Driving cycle comparisons of energy economies and emissions from an alcohol and gasoline fueled vehicle
[CONF-790520-7] N80-13274
EULER-LAGRANGE EQUATION
Formulation of the equations of motion of a deformable aircraft using Lagrange's equations in an arbitrary non-inertial frame of reference
[RAE-TM-STRUCT-941] N80-13036
EUROPE
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
EUROPEAN SPACE AGENCY
Report on European astronomical and astrophysical activities
N80-13999
EUROPEAN SPACE PROGRAMS
Application of a tracking and Data Relay Satellite System [TDRSS] to European requirements
[BMFT-FB-W-78-37] N80-13131
EUTECTIC ALLOYS
Solidification of some eutectic alloys under microgravity conditions and at 1 g
N80-13097
Study of the influence of gravity on the solidification of irregular eutectic alloys
N80-13119
EUTROPHICATION
Dissolved organic matter and lake metabolism
[COO-1599-153-PT-1] N80-13604
EVALUATION
Classification and technical review of dc-ac inverters for use in photovoltaic power systems
[COO-4094-25] N80-13377
Scientific literature: Can we keep it from ruining science
[UCRL-81118] N80-13985
Evaluation and application of an intensified CCD array photometer for astronomical observations
N80-13995
EVAPORATION
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
EVAPORATIVE COOLING
Evaporative cooling on a grooved surface
[NASA-CR-160410] N80-13401
A fundamental study of liquid spray evaporation at a heated surface
[NASA-CR-160409] N80-13405
EVAPOTRANSPIRATION
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
The estimation of soil moisture content and actual evapotranspiration using thermal infra-red remote sensing --- Buckinghamshire, England
[E80-10021] N80-13599
Estimation of regional evapotranspiration and soil moisture conditions using remotely sensed crop surface temperatures
[REPT-1003] N80-13616
EVOLUTION [DEVELOPMENT]
Coalification reactions under pressure
[MLM-2556[TR]] N80-13284
EXCIMER LASERS
Nuclear pumping mechanisms in atomic carbon and in excimers
N80-13445
Simulation studies for a nuclear photon pumped excimer laser
N80-13452
EXCITATION
University of Florida nuclear pumped laser program --- excitation of laser gaseous
N80-13439
EXHAUST EMISSION
Exhaust emissions characteristics for a general aviation light aircraft Teledyne Continental Motors 6-285-B piston engine
[AD-A074338] N80-13042
Atomizing characteristics of swirl can combustor modules with swirl blast fuel injectors --- in terms of NOX emission rate
[NASA-TM-79297] N80-13047
Effects of rocket exhaust products in the thermosphere and ionosphere
[LA-7926-MS] N80-13167
Driving cycle comparisons of energy economies and emissions from an alcohol and gasoline fueled vehicle
[CONF-790520-7] N80-13274
The 50,000 mile methanol/gasoline blend fleet study --- fuel efficiency and exhaust emissions
[CONF-790520-6] N80-13275
Evaluation of methanol for reduced exhaust emissions in a single-cylinder research engine
[CONF-790520-3] N80-13276
Low NO[x] heavy fuel combustor program
[NASA-TM-79313] N80-13624
An analytical study of nitrogen oxides and carbon monoxide emissions in hydrocarbon combustion with added nitrogen, preliminary results
[NASA-TM-79296] N80-13721
EXHAUST GASES
Advanced catalytic combustors for low pollutant emissions, phase 1
[NASA-CR-159535] N80-13048
Application of synthetic molecular sieve zeolites and silica gel toward the separation of sulfur dioxide from combustion gases
N80-13180
EXHAUST NOZZLES
Assessment at full scale of exhaust nozzle to wing size on STOL-OTW acoustic characteristics
[NASA-TM-79279] N80-13881
EXOBIOLOGY
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 199
[NASA-SP-7011[199]] N80-13762
EXPERIMENTAL DESIGN
Numerical and experimental simulation of microgravity-convection
N80-13112
An experimental method for determination of mass transport in liquid metals to be applied under microgravity
N80-13120
The nuclear and ionic charge distribution particle experiments on the ISEE-1 and ISEE-C spacecraft
[BMFT-FB-W-78-38] N80-13132
The Miranda star sensor experiment
[RAE-TR-78112] N80-13146
University of Illinois nuclear pumped laser program --- experiments with a TRIGA pulsed reactor with a broad pulse and a low peak flux
N80-13444
Experiment and prediction in the bending of a nickel beam at 200 deg C
[COO-2733-21] N80-13519
Report of the fifth planning meeting for the Monsoon Experiment [MONEX]. Part 1: Winter MONEX
[GARP-SPEC-REPT-30] N80-13748
EXPLORATION
Development of mining guidance and control systems
[NASA-TM-78226] N80-13601
EXPLORER 41 SATELLITE
Particle and field characteristics of the dayside magnetopause energetic electron layer
N80-13546

EXPLORER 51 SATELLITE
Ionospheric convection at high latitudes
N80-13551
EXPLOSIONS
Reflected blast measurements at small scaled distances for M26E1 propellant
[AD-A073409] N80-13269
Effects of metallurgical microstructure of armatures on compressed magnetic field generators
[SAND-79-0890C] N80-13375
EXPONENTIAL FUNCTIONS
Statistical analysis of finite mixtures of exponential and Weibull distributions
N80-13857
Bayesian parameter and reliability estimation for a multivariate exponential distribution
N80-13862
EXTINGUISHING
Studies of premixed hydrogen flames --- flame extinction
N80-13190
Experimental study of hydrogen jet ignition and jet extinguishment --- breeder reactor safety
[HEDL-TME-78-80] N80-13198
EXTRATERRESTRIAL ENVIRONMENTS
Physical processes affecting the performance of high-power, frequency-doubled short-pulse laser systems: Analysis, simulation, and experiment
N80-13437
EXTREMELY LOW FREQUENCIES
Magnetic pulsations observed on board GEOS-2 in the ULF range during multiple magnetopause crossings
N80-13541
EXTREMUM VALUES
Nonparametric families of life distributions. 1: Extreme points. Characteristics
N80-13859

F

FACTOR ANALYSIS
Methods for factor screening in computer simulation experiments
[AD-A073449] N80-13824
FACTORIAL DESIGN
Methods for factor screening in computer simulation experiments
[AD-A073449] N80-13824
FAILURE ANALYSIS
Investigation of advanced prognostic analysis techniques --- failure analysis and wear tests of mechanical drive gears
[AD-A073553] N80-13032
Fractographic study of a thick wall pressure vessel failure --- safety and reliability of nuclear pressure vessels
[CONF-790730-2] N80-13522
FAILURE MODES
Delayed failure of vanadium-hydrogen alloys
[COO-3459-15] N80-13227
FAR FIELDS
Radiation fields of dielectric optical waveguides
N80-13325
FAR ULTRAVIOLET RADIATION
Anti-Stokes emission as a VUV and soft X-ray source
[NASA-CR-162266] N80-13923
FARM CROPS
Beauce TELLUS project --- France
[E80-10024] N80-13600
FARMLANDS
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
FATIGUE [MATERIALS]
Elevated temperature exposure has significant effects on the structure of austenitic stainless steel welds
[CONF-790736-1] N80-13232
Fatigue aging of adhesive bonds
[SAND-78-1842C] N80-13262
Fatigue and creep behavior of Si3N4 and SiC for gas turbine applications
[EPRI-FP-1060] N80-13483
Initiation and growth of fatigue microcracks and strain-controlled fatigue properties in steel alloys: Microstructure and mechanics
N80-13508
Materials testing for central receiver solar-thermal power systems
[TID-29443] N80-13695
FATIGUE LIFE
Fatigue and delayed failure of refractory metals --- canadium and niobium hydride alloys
[COO-3459-14] N80-13233
Ultrasonic attenuation as an indicator of fatigue life of graphite/epoxy fiber composite
[NASA-CR-3179] N80-13488
FATIGUE TESTS
Digital load control applied to full-scale airframe fatigue tests
[AD-A073588] N80-13054
FEASIBILITY ANALYSIS
Concept study of a shuttle-satellite in consideration of European satellite developments and launcher systems for the 1980's
[BMFT-FB-W-78-25] N80-13129
Feasibility study within the Spacelab utilization program: Common equipment, communication/navigation [COMNAV]
[BMFT-FB-W-78-36] N80-13130
Feasibility study for Spacelab user program: Propagation of electromagnetic waves
[BMFT-FB-W-78-10] N80-13344
Feasibility study of an active system for transformer noise abatement
[COO-4376-T1] N80-13378
FEEDBACK CONTROL
Synthesis of a control model for a liquid nitrogen cooled, closed circuit, cryogenic nitrogen wind tunnel and its validation
[NASA-CR-162508] N80-13058
On the interaction between system and task parameters through continuous manual control
[FB-42] N80-13780
FEEDBACK FREQUENCY MODULATION
Count state analysis of a digital phase locked loop
N80-13352
FERMENTATION
Conversion of biomass from agriculture into useful products --- cellulose hydrolysis and butanediol fermentation
[COO-4298-1] N80-13278
FERRITES
Elevated temperature exposure has significant effects on the structure of austenitic stainless steel welds
[CONF-790736-1] N80-13232
FERRITIC STAINLESS STEELS
The influence of thermal history, deformation, and composition, on stress corrosion cracking of ferritic stainless steels
N80-13211
FERROMAGNETIC MATERIALS
The influence of ceramic permanent magnets on the armature of a small potential dc motor
[REPT-1631] N80-13386
FIBER OPTICS
Optical digital techniques
[NASA-CR-160392] N80-13922
FIELD EFFECT TRANSISTORS
Process oriented design aids for very large scale integrated circuits
N80-13348
FIELD EMISSION
Experimental investigation of the absolute tunneling current density in field emission from tungsten [110]
N80-13963
FIELD THEORY [PHYSICS]
Migration of gas bubbles under various force fields in a microgravitational environment
N80-13113
FIGHTER AIRCRAFT
Summary of low-speed longitudinal aerodynamics of two powered close-coupled wing-canard fighter configurations --- conducted in Langley C/STOL tunnel
[NASA-TP-1535] N80-12994
Effects of fuselage forebody geometry on low-speed lateral-directional characteristics of twin-tail fighter model at high angles of attack
[NASA-TP-1592] N80-13002
FILE MAINTENANCE [COMPUTERS]
TFILE: A user callable tape file archiving system for NOS
[SAND-78-2022] N80-13829
FILLERS
Improved fiber retention by the use of fillers in graphite fiber/resin matrix composites
[NASA-TM-79288] N80-13171
FINANCIAL MANAGEMENT
The George 3 and 4 accounting system
[RAE-TR-78080] N80-13983
FINE STRUCTURE
Determining biological fine structure by differential absorption of soft X-ray
[BNL-26282] N80-13760
FINITE DIFFERENCE THEORY
A theoretical study of the supercritical aerofoil NLR 7301, and comparison with experiments --- shock tunnel tests
[RAE-TR-78119] N80-13010
MINT computer program for numerical computation of turbulent flow: An overview
[GA-A-15148] N80-13415
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-79/0851/0] N80-13425
Numerical methods in fluid flow problems, volume 5. A bibliography with abstracts
[NTIS/PS-79/0852/8] N80-13426
Experimental and predicted performance for the combustion of a low heating value gas in a swirl burner --- finite difference analysis
N80-13467
SLIC: An interactive mesh generator for finite element and finite difference application programs
[UCRL-81931] N80-13793
FINITE ELEMENT METHOD
A survey of finite element-related techniques as applied to acoustic propagation in the ocean. Part 1: Finite element method and related techniques
N80-13300
A survey of finite element-related techniques as applied to acoustic propagation in the ocean. Part 2: Transparent boundary simulation techniques
N80-13304
INCAP: A finite element program for one-dimensional nonlinear inverse heat conduction analysis
[ORNL/NUREG/CSD/TM-8] N80-13407
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-79/0851/0] N80-13425
Numerical methods in fluid flow problems, volume 5. A bibliography with abstracts
[NTIS/PS-79/0852/8] N80-13426
Modelling of crack tip deformation with finite element method and its aplications
N80-13503
A new equilibrium finite element analysis of stresses in orthotropic cylinders with temperature dependent material properties
N80-13506
Application of finite element programs APES, ASAS and MARC to linear fracture mechanics
[LTR-ST-1118] N80-13511
Analysis of surface cracks in finite plates under tension or bending loads
[NASA-TP-1578] N80-13512
Finite element linear models for symmetrically loaded thin shells of revolution
[LA-UR-79-1321] N80-13515
SLIC: An interactive mesh generator for finite element and finite difference application programs
[UCRL-81931] N80-13793
FIRE EXTINGUISHERS
Comparative evalution of firefighting foam agents --- extinguishing Jet A fuel fires
[AD-A074490] N80-13253
FIRE FIGHTING
Comparative evalution of firefighting foam agents --- extinguishing Jet A fuel fires
[AD-A074490] N80-13253
FIRES
Airflow effects on fires, part 2
[AD-A073486] N80-13196
FLAME PROPAGATION
Airflow effects on fires, part 2
[AD-A073486] N80-13196
FLAME STABILITY
Multiplicity and stability of nonadiabatic hydrogen-oxygen-nitrogen flames — mathematical models
N80-13185
FLAMES
Carbon dioxide concentration and temperature in flames measured by Raman spectroscopy
[SAND-79-8612] N80-13204
FLASHING [VAPORIZING]
Experimental investigations of nonequilibrium flashing of water in a converging-diverging nozzle
[BNL-NUREG-25716] N80-13417
FLEXIBLE BODIES
Dynamic analysis of flexible mechanisms
N80-13502
FLIGHT CHARACTERISTICS
Inclusion of unsteady aerodynamics in longitudinal parameter estimation from flight data --- use of vortices and mathematical models for parameterization from flight characteristics
[NASA-TP-1536] N80-12995
Beaver aircraft parameter identification: Technical preparations and preliminary results
[DFVLR-MITT-78-01] N80-13039
FLIGHT CREWS
Aviation night vision goggle
[AD-A073296] N80-13773
FLIGHT INSTRUMENTS
In-service improvements and modernization of all components of the instrument landing systems. Volume 1: Sections 1-10
[AD-A074425] N80-13018
In-service improvements and modernization of all components of the instrument landing systems. Volume 2: Sections 11 and 12
[AD-A074426] N80-13019
FLIGHT OPTIMIZATION
Beaver aircraft parameter identification: Technical preparations and preliminary results
[DFVLR-MITT-78-01] N80-13039
FLIGHT SAFETY
The superposition of two-dimensional error fields and its influence on flight safety of air traffic
[ESA-TT-527-REV] N80-13022
FLIGHT SIMULATORS
Application of modified profile analysis to function testing of the motion/no-motion issue in an aircraft ground-handling simulation --- statistical analysis procedure for man machine systems flight simulation
[NASA-TP-1540] N80-13024
FLIGHT TESTS
Evaluation of seating and restraint systems conducted during fiscal year 1978
[AD-A074881] N80-13014
Beaver aircraft parameter identification: Technical preparations and preliminary results
[DFVLR-MITT-78-01] N80-13039

Flight test of navigation and guidance sensor errors measured on STOL approaches
[NASA-TM-81154] N80-13041
FLIR DETECTORS
Experimental FLIR study
[AD-A073361] N80-13926
FLOATING
Steady and oscillatory Marangoni convection in floating zones under 1g
N80-13111
FLOW DISTORTION
Sample stream distortion modeled in continuous-flow electrophoresis
[NASA-TM-78178] N80-13192
Internal combustion engine sampling probes: A study of sample-gas origins, flow disturbances and quench-layer bias
N80-13468
FLOW DISTRIBUTION
Investigation of flow characteristics over missile bodies at supersonic speeds
[NASA-TP-1579] N80-13001
Experimental investigation of the local density and temperature distribution in the flow field around a sphere with high thermodynamic nonequilibrium using the electron beam technique
[ESA-TT-516-REV] N80-13012
MINT computer program for numerical computation of turbulent flow: An overview
[GA-A-15148] N80-13415
The performance estimation of an axial-flow compressor stage using theoretically derived blade element characteristics with experimental comparison
N80-13466
Internal magnetospheric plasma flow
N80-13574
FLOW EQUATIONS
Fluidized bed flow equations --- for a two phase chemically reacting fluid and solid
[METC/CR-78/10] N80-13414
Hybrid random choice method with application to internal combustion engines 2 --- solving cylindrically or spherically symmetric flow equations
[LBL-9423] N80-13477
FLOW GEOMETRY
Hybrid random choice method with application to internal combustion engines 2 --- solving cylindrically or spherically symmetric flow equations
[LBL-9423] N80-13477
FLOW MEASUREMENT
Temperature and flow measurements on near-freezing aviation fuels in a wing-tank model
[NASA-TM-79285] N80-13268
Horizontal two-phase flow transit time measurements
[CONF-790745-2] N80-13408
Drag devices for two-phase mass flow measurements
[CONF-790655-5] N80-13409
Two-phase flow measurements with advanced instrumented spool pieces and local conductivity probes
[CONF-790745-1] N80-13413
The development of a drag sensing three dimensional turbulent ball probe --- Ames 6 ft by 6 ft wind tunnel
[NASA-CR-152269] N80-13427
FLOW STABILITY
Centrifugal instability of decelerating swirl-flow within finite and infinite circular cylinders
N80-13391
Nonlinear simulation of type 1 irregularities in the equatorial electrojet
N80-13397
First results of a study on turbulent boundary layers in an oscillating flow with a mean adverse pressure gradient
[AAAF-NT-79-05] N80-13424
FLOW THEORY
Marangoni bubble motion in zero gravity --- Lewis zero gravity drop tower
[NASA-TM-79250] N80-13403
FLOW VELOCITY
Experimental investigations of nonequilibrium flashing of water in a converging-diverging nozzle
[BNL-NUREG-25716] N80-13417
FLOW VISUALIZATION
Unsteady flow characteristics in the near wake of a two dimensional obstacle
[AAAF-NT-79-08] N80-13008
Sample stream distortion modeled in continuous-flow electrophoresis
[NASA-TM-78178] N80-13192
FLOWMETERS
Horizontal two-phase flow transit time measurements
[CONF-790745-2] N80-13408
Two-phase flow measurements with advanced instrumented spool pieces and local conductivity probes
[CONF-790745-1] N80-13413
FLUID BOUNDARIES
Fundamental and applied aspects of fluid physics under microgravity
N80-13103
Steady and oscillatory Marangoni convection in floating zones under 1g
N80-13111
Marangoni convection in a liquid layer subjected to rotation about a transverse axis
N80-13115
Phase behavior and interfacial tension studies of surfactant systems
N80-13395
FLUID DYNAMICS
The fluid physics module: A contribution to materials science and physics in space
N80-13087
Fundamental and applied aspects of fluid physics under microgravity
N80-13103
FLUID FLOW
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-79/0851/0] N80-13425
Numerical methods in fluid flow problems, volume 5. A bibliography with abstracts
[NTIS/PS-79/0852/8] N80-13426
FLUID LOGIC
Real-time emulation of hardware
N80-13802
FLUID MECHANICS
Basic research needs in fluid mechanics
[BNL-50995] N80-13418
A fluid mechanical-kinetic theory description of a spherically symmetric discharge in a neutral medium
N80-13464
FLUID PRESSURE
Tidal pressure response as a reservoir engineering tool
[UCRL-83012] N80-13647
FLUIDIZED BED PROCESSORS
Regenerative process for desulfurization of high temperature combustion and fuel gases
[BNL-50944] N80-13277
Gas generator research and development: BI-GAS process
[FE-1207-62] N80-13288
Fluidized bed flow equations --- for a two phase chemically reacting fluid and solid
[METC/CR-78/10] N80-13414
FLUTTER
Flutter spectral measurements using stationary pressure transducers
[NASA-TM-79293] N80-13046
Active flutter control for flexible vehicles, volume 1
[NASA-CR-159160] N80-13053
FLUTTER ANALYSIS
The development of active control and its application to flutter suppressors --- wind tunnel test results
[AAAF-NT-79-02] N80-13056
The shock and vibration digest, volume 11, number 5
[AD-A069685/6] N80-13306
Some recent trends in aircraft flutter research --- analysis of flutter for aircraft design and use of oblique wings in aircraft configurations
N80-13307
FLUX DENSITY
Harmonic current propagation on AC systems due to HUDC links
N80-13326
Initial results on solar wind alpha particle distributions as measured by Helios between 0.3 and 1 AU
N80-14010
Two states of the solar wind at the time of minimum solar activity. Part 2: Radial gradients of plasma parameters in fast and slow streams
N80-14014
FLYWHEELS
Mechanical power system for aircraft intermittent utility functions --- systems engineering of using flywheels for aircraft control equipment
[AD-A073297] N80-13030
Impact of flywheel-transmissions on automobile performance: A logical basis for evaluation
[UCRL-52758] N80-13480
Recent spin test of two composite wagon wheel flywheels
[SAND-79-1669C] N80-13640
Application of inertia welding technology to steel disc-type flywheels
[UCRL-15045] N80-13652
FOAMS
Comparative evalution of firefighting foam agents --- extinguishing Jet A fuel fires
[AD-A074490] N80-13253
Effects of soft foam insulation impact --- on shuttle orbiter high temperature reusable surface insulation tiles
[NASA-CR-160400] N80-13472
FOLDING
An iterative unfolding technique
[ARWE-O-25/79] N80-13853
FORCED VIBRATION
An analytical investigation of three-dimensional vibration in gear-coupled rotor systems
N80-13471
FOREBODIES
Effects of fuselage forebody geometry on low-speed lateral-directional characteristics of twin-tail fighter model at high angles of attack
[NASA-TP-1592] N80-13002
FORESTS
Digital processing of LANDSAT MSS and topographic data to improve capabilities for computerized mapping of forest cover types --- Colorado and Washington
[E80-10009] N80-13588
FORMING TECHNIQUES
Characterization and properties of controlled nucleation thermochemical deposited [CNTD] silicon carbide
[NASA-TM-79277] N80-13254
FORMULATIONS
Development of alternate silicone potting compounds. Volume 5: Development of substitute no. 1 for Dow Corning's aerospace sealant DC93-122
[UCRL-52434-VOL-5] N80-13374
FOSSIL FUELS
Low NO[x] heavy fuel combustor program
[NASA-TM-79313] N80-13624
Fossil energy program. 1. Mining research and development: Coal preparation and analysis
[IS-4655] N80-13679
Fossil energy program, 1. Mining research and development: Coal preparation and analysis
[IS-4703] N80-13702
Guidelines for multimedia environmental monitoring of Department of Energy fossil energy RD and D facilities
[FE-2495-T13-VOL-2] N80-13724
FOURIER TRANSFORMATION
Quantitative gas analysis using Fourier transform infrared spectroscopy
[SAND-79-0968] N80-13202
FRACTOGRAPHY
Fractographic study of a thick wall pressure vessel failure --- safety and reliability of nuclear pressure vessels
[CONF-790730-2] N80-13522
FRACTURE MECHANICS
Combined macroscopic and microscopic approach to the fracture of metals
[COO-3084-69] N80-13229
Fatigue and delayed failure of refractory metals --- canadium and niobium hydride alloys
[COO-3459-14] N80-13233
A correlation between morphology and fracture properties of epoxy resins
N80-13248
Application of finite element programs APES, ASAS and MARC to linear fracture mechanics
[LTR-ST-1118] N80-13511
FRACTURE STRENGTH
Fracture toughness of graphite/epoxy composite laminates enhanced by the intermittent interlaminar bonding strength
N80-13169
Comparison tests and experimental compliance calibration of the proposed standard round compact plane strain fracture toughness specimen
[NASA-TM-81379] N80-13513
FRACTURES [MATERIALS]
Deformation and failure information from composite materials via acoustic emission
[UCRL-81272] N80-13177
Time-dependent fracture of materials at elevated temperature --- conference
[CONF-790236] N80-13520
FRANCE
A container for conditioning space experiments
N80-13093
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
Beauce TELLUS project --- France
[E80-10024] N80-13600
Report on French research into the ionosphere-magnetosphere from 1975 to 1978
[CRPE-DT-1039] N80-13738
FREE CONVECTION
Fundamental experiments on interfacial convection; Project TEXUS 1 and 2
N80-13102
Contributions to Marangoni convection in cylindric melting zones: Experimental simulation and calculation of the influence of gravity
[BMFT-FB-W-78-39] N80-13421
FREE ENERGY
The gradient theory of fluid interfaces
N80-13394
FREE VIBRATION
A review of approximate methods for determining the vibrational modes of membranes
N80-13498
FREEZING
Temperature and flow measurements on near-freezing aviation fuels in a wing-tank model
[NASA-TM-79285] N80-13268
FRENCH SATELLITES
SPOT, French preoperational remote sensing satellite system
N80-13610
FRENCH SPACE PROGRAMS
Results of French experiments on crystal growth from a vapor phase conducted on the ground as a part of the space program
N80-13116

FREQUENCIES
Measurement of the electrical properties of composite materials in the frequency range of DC to 30 MHz
[AD-A073638] N80-13175
FREQUENCY ANALYZERS
Autoregressive acquisition and interference-test coding for spread spectrum communications
N80-13329
FREQUENCY DISTRIBUTION
Nonlinear optics: Parametric amplification at 16 micrometers and oscillator mode competition
[LA-7850-T] N80-13927
FREQUENCY RESPONSE
Analysis techniques of experimental frequency response data
N80-13497
Theoretical analysis of multi-cell, high efficiency broad spectral sensitivity solar cells
N80-13617
FREQUENCY SHIFT
An investigation of the technical feasibility of using pulsed optical pumping to eliminate the light shift and improve the longterm stability of passive rubidium frequency standards
[AD-A073757] N80-13925
FREQUENCY STABILITY
An investigation of the technical feasibility of using pulsed optical pumping to eliminate the light shift and improve the longterm stability of passive rubidium frequency standards
[AD-A073757] N80-13925
FREQUENCY STANDARDS
An investigation of the technical feasibility of using pulsed optical pumping to eliminate the light shift and improve the longterm stability of passive rubidium frequency standards
[AD-A073757] N80-13925
FRICTION DRAG
Assessment of a method for predicting the drag and boundary layer development on a body of revolution at zero incidence
[AMTE[N]-R-78111] N80-13006
FRICTION WELDING
Application of inertia welding technology to steel disc-type flywheels
[UCRL-15045] N80-13652
FRONTS [METEOROLOGY]
The influence of thermal fronts upon the solutions of an analytical model of a mid-latitude wave-cyclone
N80-13740
FROST
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
FUEL CAPSULES
Effect of deviations from the Maxwell distribution on neutron production in laser targets
[LA-7532-MS] N80-13460
FUEL CELLS
Distribution and movement of electrolyte in fuel cells and batteries
N80-13619
Integral cell scale-up and performance verification
[EPRI-EM-1134] N80-13646
FUEL COMBUSTION
Analysis of combustion instability in liquid fuel rocket motors
[NASA-CR-159733] N80-13164
Amplification of Reynolds number dependent processes by wave distortion --- liquid fuel combustor stability
[NASA-CR-159732] N80-13193
Theoretical studies on heterogeneous combustion --- of liquid fuel droplets in sprays
[COO-4433-2] N80-13200
FUEL CONSUMPTION
The 50,000 mile methanol/gasoline blend fleet study --- fuel efficiency and exhaust emissions
[CONF-790520-6] N80-13275
Current U. S. petroleum situation and short-term supply/demand outlook
[DOE/EIA-0184/5] N80-13607
FUEL INJECTION
Atomizing characteristics of swirl can combustor modules with swirl blast fuel injectors --- in terms of NOX emission rate
[NASA-TM-79297] N80-13047
FUEL SPRAYS
Theoretical studies on heterogeneous combustion --- of liquid fuel droplets in sprays
[COO-4433-2] N80-13200
FUEL TESTS
Experimental investigation of a solid fuel ramjet
[DFVLR-FB-78-27] N80-13485
FUELS
Evaluation of methanol for reduced exhaust emissions in a single-cylinder research engine
[CONF-790520-3] N80-13276
Status of alcohol fuels utilization technology for stationary gas turbines
[HCP/M2098-03] N80-13283
FUNCTIONS [MATHEMATICS]
Evaluation of integrals whose integrands are oscillatory and singular
N80-13838
An iterative unfolding technique
[ARWE-O-25/79] N80-13853
Estimation of smoothing parameters to smooth noisy data and confidence regions for the underlying function
N80-13856
FURNACES
Experiment modules and facilities in TEXUS 1 and 2
N80-13092
FUSION [MELTING]
Reactions between glass melts
N80-13101
FUSION REACTORS
Synfuel [hydrogen] production from fusion power
[LA-UR-79-1115] N80-13296
Remote systems requirements of the High Yield Lithium Injection Fusion Energy [HYLIFE] converter concept --- systems engineering of remote sensors for inspection of fusion reactor electric power plant
[UCRL-81309] N80-13908
Fusion power program
[ANL/FPP-78-4] N80-13941

G

GADOLINIUM
Studies in structure and magnetic short range order. 1: Structure in amorphous germanium. 2: Magnetic interactions in gadolinum gallium garnet
N80-13956
GALLIUM ALLOYS
Nonstationary analysis of the macrosegregation during the solidification in the space of the system Ge-Ga
N80-13107
GALLIUM ANTIMONIDES
Some 3-5-semiconductor crystals grown by the traveling-heater method
N80-13117
GALLIUM ARSENIDE LASERS
Difference frequency mixing in insulating GaAs and magnetooptical studies in Hg0.89Mno.11Te
N80-13952
GALLIUM ARSENIDES
Heterojunction materials and characteristics --- molecular structure study of gallium arsenides aluminum compounds heterojunction devices
[AD-A073792] N80-13365
Chromium doped semi-insulating gallium arsenide grown by liquid phase epitaxy
N80-13949
Transient phenomena in electron transport in semiconductors
[AD-A073009] N80-13966
GALLIUM COMPOUNDS
Studies in structure and magnetic short range order. 1: Structure in amorphous germanium. 2: Magnetic interactions in gadolinum gallium garnet
N80-13956
GALVANOMETERS
User's handbook for GT8 galvanometer drive amplifier system
[OUEL-1284/79] N80-13436
GAMMA FUNCTION
Transients effects in M/G/1 queues; an empirical investigation
[AD-A073744] N80-13833
Some contributions to gamma-minimax and empirical Bayes selection procedures
[AD-A073574] N80-13869
GAMMA RAY SPECTRA
Development of an airborne gamma radiation system for snow surveys
[EGG-1183-1679] N80-13606
GAMMA RAYS
Preparation and characterization of polymers formed by irradiation of beta-pinene and other monomers
N80-13249
Transmission of free-running laser pulses of high energy and power densities through previously gamma radiated fiber waveguides
[SAND-79-0441] N80-13462
The boundary of a pulsar magnetosphere: Gamma-ray pulsars
N80-13566
X-ray and gamma ray transmission densitometry
[CONF-790692-1] N80-13910
GAS ANALYSIS
Quantitative gas analysis using Fourier transform infrared spectroscopy
[SAND-79-0968] N80-13202
GAS CHROMATOGRAPHY
Gas chromatograph analysis of the Venus atmosphere chemical composition on board the Venera-12 automatic interplanetary station
[D-275] N80-14007
GAS DENSITY
Performance of a pressurized multiwire proportional chamber for neutron radiography
[LBL-9316] N80-13897
GAS DISSOCIATION
The rate of dissociation of CO2 on liquid iron and nickel
N80-13215
Laser driven breakdown-heating waves in magnetized hydrogen --- gas dissociation
N80-13933
GAS DYNAMICS
Effects of cellular structure on the behavior of gaseous detonation waves under transient conditions
[UCRL-82270] N80-13411
GAS EXCHANGE
Membrane oxygen enrichment cost and application evaluation
[ANL-78-108] N80-13205
GAS EXPLOSIONS
Effects of cellular structure on the behavior of gaseous detonation waves under transient conditions
[UCRL-82270] N80-13411
GAS FLOW
Internal combustion engine sampling probes: A study of sample-gas origins, flow disturbances and quench-layer bias
N80-13468
GAS JETS
Experimental study of hydrogen jet ignition and jet extinguishment --- breeder reactor safety
[HEDL-TME-78-80] N80-13198
GAS LASERS
Compilation of data relevant to nuclear pumped lasers, volume 5
[AD-A073575] N80-13457
GAS MIXTURES
Molecular two dimensional flow of mixtures of light and heavy gases with diffuse and specular reflection
[ESA-TT-508-REV] N80-13011
Spectral emission of nuclear excited XeBr*
N80-13443
GAS TEMPERATURE
Carbon dioxide concentration and temperature in flames measured by Raman spectroscopy
[SAND-79-8612] N80-13204
Warm/cold cloud processes
[NASA-CR-161336] N80-13743
GAS TUNGSTEN ARC WELDING
Automated welding of nuclear piping systems --- gas tungsten arc welding in nuclear power plants
[CONF-790841-1] N80-13478
GAS TURBINE ENGINES
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 1: Final report
[NASA-CR-159691] N80-13043
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 2: Users manual
[NASA-CR-159692] N80-13044
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 3: Library of maps
[NASA-CR-159693] N80-13045
Advanced catalytic combustors for low pollutant emissions, phase 1
[NASA-CR-159535] N80-13048
Development of mainshaft high-speed cylindrical roller bearings for gas turbine engines
[AD-A073381] N80-13475
GAS TURBINES
Development of high temperature resistant, incorrodible, non-metallic ceramic materials: The use of silicon nitride for heat exchangers in gas turbine applications
[BMFT-FB-T-78-51] N80-13266
Status of alcohol fuels utilization technology for stationary gas turbines
[HCP/M2098-03] N80-13283
Feasibility of SiC composite structures for 1644 deg gas turbine seal applications
[NASA-CR-159597] N80-13474
Fatigue and creep behavior of Si3N4 and SiC for gas turbine applications
[EPRI-FP-1060] N80-13483
Low NO[x] heavy fuel combustor program
[NASA-TM-79313] N80-13624
GAS-LIQUID INTERACTIONS
Preparation of a coal conversion systems technical data book, project 61003
[FE-2286-32] N80-13281
Development of a mass transfer machine for gas/liquid operations in the absence of gravity
[BMFT-FB-W-78-20] N80-13420
GAS-METAL INTERACTIONS
A thermogravimetric system for investigating gas-metal reactions at elevated temperatures
[AD-A073412] N80-13194
An adsorption study of hydrogen on iron and its relation to hydrogen embrittlement
N80-13209
Neutron spectroscopy of fast hydrogen diffusion in BCC transition metals
[BNL-26075] N80-13225
Delayed failure of vanadium-hydrogen alloys
[COO-3459-15] N80-13227
GASES
Experimental and predicted performance for the combustion of a low heating value gas in a swirl burner --- finite difference analysis
N80-13467
GASIFICATION
Commercialization task force for high Btu gasification
[TID-28849] N80-13286

Gasification of residual materials from coal liquefaction
[FE-2247-22] N80-13289
GASOHOL [FUEL]
Physical properties of gasoline/alcohol automotive fuels
[CONF-790520-4] N80-13273
The 50,000 mile methanol/gasoline blend fleet study --- fuel efficiency and exhaust emissions
[CONF-790520-6] N80-13275
GASOLINE
Driving cycle comparisons of energy economies and emissions from an alcohol and gasoline fueled vehicle
[CONF-790520-7] N80-13274
The 50,000 mile methanol/gasoline blend fleet study --- fuel efficiency and exhaust emissions
[CONF-790520-6] N80-13275
GEARS
Investigation of advanced prognostic analysis techniques --- failure analysis and wear tests of mechanical drive gears
[AD-A073553] N80-13032
An analytical investigation of three-dimensional vibration in gear-coupled rotor systems
N80-13471
GENERAL AVIATION AIRCRAFT
Exploratory study of the effects of wing-leading-edge modifications on the stall/spin behavior of a light general aviation airplane
[NASA-TP-1589] N80-13026
Exhaust emissions characteristics for a general aviation light aircraft Teledyne Continental Motors 6-285-B piston engine
[AD-A074338] N80-13042
GEOCHEMISTRY
Summaries of physical research in the geosciences
[DOE/ER-0030] N80-13582
GEODESY
Investigations on the hierarchy of reference frames in geodesy and geodynamics
[NASA-CR-162499] N80-13731
GEODETIC COORDINATES
Satellite Doppler positioning in strengthening geodetic networks
N80-13015
OPS MCC level B/C formulation requirements: Area targets and space volumes processor
[NASA-TM-80839] N80-13840
GEODETIC SATELLITES
Satellite Doppler positioning in strengthening geodetic networks
N80-13015
GEODYNAMICS
Investigations on the hierarchy of reference frames in geodesy and geodynamics
[NASA-CR-162499] N80-13731
GEOLOGICAL SURVEYS
Remote sensing applied to geology and mineralogy. A bibliography with abstracts
[NTIS/PS-79/0844/5] N80-13612
Remote sensing applied to geology. Citations from the International Aerospace Abstracts data base
[NTIS/PS-79/0822/1] N80-13613
Geothermal energy. Part 1: Exploration, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0814/8] N80-13715
GEOLOGY
Coalification reactions under pressure
[MLM-2556[TR]] N80-13284
Summaries of physical research in the geosciences
[DOE/ER-0030] N80-13582
GEOMAGNETIC LATITUDE
Ionospheric convection at high latitudes
N80-13551
Ion composition in the Dayside Cusp: Injection of ionospheric ions into the high latitude boundary layer
N80-13553
Theory of the low attitude boundary layer
N80-13580
GEOMAGNETIC PULSATIONS
Magnetic pulsations observed on board GEOS-2 in the ULF range during multiple magnetopause crossings
N80-13541
GEOMAGNETISM
Global aspects of the Earth's magnetopause
N80-13530
Particle and field characteristics of the dayside magnetopause energetic electron layer
N80-13546
GEOMETRY
OPS MCC level B/C formulation requirements: Area targets and space volumes processor
[NASA-TM-80839] N80-13840
GEOMORPHOLOGY
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
Crustal structure in areas of active crustal accretion
N80-13727
GEOPHYSICS
Summaries of physical research in the geosciences
[DOE/ER-0030] N80-13582
Space environment and lunar surface processes
[NASA-CR-160363] N80-14003
GEOPOTENTIAL
The gravity field of the earth
[RAE-TR-78142] N80-13737
GEOPOTENTIAL HEIGHT
Determination and geophysical intepretation of the orbit of China 2 rocket [1971-18B]
[RAE-TR-78107] N80-13137
GEORGIA
Automated prediction of boundary layer winds and turbulence for the Savannah River Laboratory
[NOAA-TR-NWS-1007-1] N80-13746
GEOS 1 SATELLITE
Radial discontinuities in low-energy magnetospheric plasma observed on GEOS-1
N80-13537
Multiple-satellite observations of large scale trapping boundary motions
N80-13549
GEOS 2 SATELLITE
Magnetic pulsations observed on board GEOS-2 in the ULF range during multiple magnetopause crossings
N80-13541
A wave-particle-wave interaction observed on GEOS-2
N80-13543
Variations of electron and ion distributions during dayside magnetopause crossings of GEOS-2
N80-13548
STARE ionospheric electron flows during the August 28, 1978 GEOS-2 magnetopause crossing
N80-13552
GEOS 3 SATELLITE
A study of possible sea state information in the sample and hold gate statistics for the GEOS-3 satellite altimeter
[NASA-CR-156858] N80-13753
GEOTHERMAL ENERGY CONVERSION
Condensation and evaporation heat transfer with low-boiling temperature fluids --- for ocean thermal and geothermal energy conversion
[CONF-790539-1] N80-13412
Multi-use geothermal energy system with augmentation for enhanced utilization. Non-electric application of geothermal energy in Susanville, California
[DOE/ET-248447/1] N80-13660
Hot dry rock geothermal energy development program
[LA-7807-HDR] N80-13673
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0815/5] N80-13716
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0816/3] N80-13717
Geothermal energy, volume 3. Citations from the Engineering Index data base
[NTIS/PS-79/0818/9] N80-13718
Geothermal energy. Part 3: Technology and general studies, volume 4. Citations from the NTIS data base
[NTIS/PS-79/0817/1] N80-13719
Geothermal energy, volume 4. Citations from the Engineering Index data base
[NTIS/PS-79/0819/7] N80-13720
GEOTHERMAL RESOURCES
Geopressure energy resource evaluation --- Texas and Louisiana
[ORNL/PPA-79/2] N80-13605
Analysis of binary thermodynamic cycles for a moderately low-temperature geothermal resource
[TREE-1365] N80-13627
Tidal pressure response as a reservoir engineering tool
[UCRL-83012] N80-13647
Multi-use geothermal energy system with augmentation for enhanced utilization. Non-electric application of geothermal energy in Susanville, California
[DOE/ET-248447/1] N80-13660
Hot dry rock geothermal energy development program
[LA-7807-HDR] N80-13673
Geothermal energy. Part 1: Exploration, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0814/8] N80-13715
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0815/5] N80-13716
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0816/3] N80-13717
Geothermal energy, volume 4. Citations from the Engineering Index data base
[NTIS/PS-79/0819/7] N80-13720
GERMANIUM
The influence of space conditions on directional crystallization of germanium and its properties
N80-13072
Nonstationary analysis of the macrosegregation during the solidification in the space of the system Ge-Ga
N80-13107
Studies in structure and magnetic short range order. 1: Structure in amorphous germanium. 2: Magnetic interactions in gadolinum gallium garnet
N80-13956
GERMANY
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
Strategies for the surveillance of coastal waters of the Federal Republic of Germany
[BMFT-FB-M-77-11] N80-13726
GLASS
Manufacturing of oxide glasses. Critical comment on proposals for melting and solidification experiments under zero-g conditions
[BMFT-FB-W-78-06] N80-13127
Evaluation of cleaners for photovoltaic modules exposed in an outdoor environment
[NASA-TM-79248] N80-13317
GLASS COATINGS
Solar power satellite system definition study. Volume 6: Silicon solar cell annealing test, phase 1
[NASA-CR-160373] N80-13142
GLASS FIBERS
Transmission of free-running laser pulses of high energy and power densities through previously gamma radiated fiber waveguides
[SAND-79-0441] N80-13462
GLIDE PATHS
In-service inprovements and modernization of all components of the instrument landing systems. Volume 1: Sections 1-10
[AD-A074425] N80-13018
In-service improvements and modernization of all components of the instrument landing systems. Volume 2: Sections 11 and 12
[AD-A074426] N80-13019
GLOBAL POSITIONING SYSTEM
Shuttle GPS R/PA configuration and specification study
[NASA-CR-160396] N80-13360
GOGGLES
Aviation night vision goggle
[AD-A073296] N80-13773
GOLD
Initial epitaxy and interdiffusion phenomena in Au-Cu bilayers --- microstructure
N80-13948
GONDOLAS
Design assessment of advanced technology lightweight, low-cost mission-configured gondola modules
[AD-A073554] N80-13029
GRADIENTS
The gradient theory of fluid interfaces
N80-13394
GRAINS [FOOD]
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study --- Kansas
[E80-10012] N80-13591
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
GRAMMARS
Building efficient pass-oriented attribute grammar evaluators
N80-13796
GRAPH THEORY
On some graph-theoretic problems in program testing
N80-13811
GRAPHITE
Property changes in graphite irradiated at changing irradiation temperature
[GA-A-15270] N80-13178
Recommendation of a triaxial failure theory for graphite
[GA-A-15333] N80-13521
GRAPHITE-EPOXY COMPOSITE MATERIALS
Fracture toughness of graphite/epoxy composite laminates enhanced by the intermittent interlaminar bonding strength
N80-13169
Hygrothermal damage mechanisms in graphite-epoxy composites
[NASA-CR-3189] N80-13170
Improved fiber retention by the use of fillers in graphite fiber/resin matrix composites
[NASA-TM-79288] N80-13171
Ultrasonic attenuation as an indicator of fatigue life of graphite/epoxy fiber composite
[NASA-CR-3179] N80-13488
Ultrasonic attenuation and velocity in AS/3501-6 graphite/epoxy fiber composite
[NASA-CR-3180] N80-13489
Recent spin test of two composite wagon wheel flywheels
[SAND-79-1669C] N80-13640
Relation of ultrasonic energy loss factors and constituent properties in unidirectional composites --- graphite-epoxy composite materials
[NASA-CR-3181] N80-13878
GRAPHS [CHARTS]
The complexity of the maximum subgraph problem
N80-13809

GRASSLANDS
A report on field work in the city of Paragominas [PA]
[E80-10001] N80-13587
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597
The estimation of soil moisture content and actual evapotranspiration using thermal infra-red remote sensing --- Buckinghamshire, England
[E80-10021] N80-13599
GRAVITATIONAL EFFECTS
Investigation of the structure of Te-Se solid solutions obtained under different gravity conditions on board the Salyut 6 station, in a centrifuge
N80-13074
Solidification of some eutectic alloys under microgravity conditions and at 1 g
N80-13097
Flow phenomena in rotating floating zones with and without Marangoni convection
N80-13104
Space experiments on chemical pattern formation
N80-13109
Study of the influence of gravity on the solidification of irregular eutectic alloys
N80-13119
Contributions to Marangoni convection in cylindric melting zones: Experimental simulation and calculation of the influence of gravity
[BMFT-FB-W-78-39] N80-13421
GRAVITATIONAL FIELDS
The gravity field of the earth
[RAE-TR-78142] N80-13737
GREAT PLAINS CORRIDOR [NORTH AMERICA]
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
GROOVES
Evaporative cooling on a grooved surface
[NASA-CR-160410] N80-13401
GROUND STATIONS
Operational procedures for ground station operation: ATS-3 Hawaii-Ames satellite link experiment
[NASA-TM-81155] N80-13333
STARE ionospheric electron flows during the August 28, 1978 GEOS-2 magnetopause crossing
N80-13552
GROUND TRUTH
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
GUIDANCE SENSORS
Flight test of navigation and guidance sensor errors measured on STOL approaches
[NASA-TM-81154] N80-13041
GUIDE VANES
Force and moment data from a wind-tunnel test of a tilt-nacelle V/STOL propulsion system with an attitude control vane --- conducted in Ames 40 by 80 foot wind tunnel
[NASA-TM-81157] N80-13003

H

HADRONS
Vector current scattering in two dimensional quantum chromodynamics
[LBL-9022] N80-13907
HAFNIUM
Structures, spectra and related properties of titanium-, zirconium-, and hafnium-doped vitreous silica
N80-13245
HAIL
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
HALL EFFECT
Resistivity and hall coefficient measurements of iron doped niobium diselenide crystals
N80-13951
HANDBOOKS
User's handbook for GT8 galvanometer drive amplifier system
[OUEL-1284/79] N80-13436
HANDICAPS
Aerodynamic characteristics of wheelchairs --- Langley V/STOL wind tunnel tests for human factors engineering
[NASA-TM-80191] N80-12999
HARMONIC GENERATIONS
Harmonic current propagation on AC systems due to HUDC links
N80-13326
HARNESSES
Evaluation of seating and restraint systems conducted during fiscal year 1978
[AD-A074881] N80-13014
HAWAII
Operational procedures for ground station operation: ATS-3 Hawaii-Ames satellite link experiment
[NASA-TM-81155] N80-13333
Energy system in the Far West: Impacts of the National Energy Act of 1978
[UCRL-52754] N80-13638
HEAT BUDGET
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
HEAT CAPACITY MAPPING MISSION
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
The estimation of soil moisture content and actual evapotranspiration using thermal infra-red remote sensing --- Buckinghamshire, England
[E80-10021] N80-13599
Beauce TELLUS project --- France
[E80-10024] N80-13600
HEAT EXCHANGERS
Development of high temperature resistant, incorrodible, non-metallic ceramic materials: The use of silicon nitride for heat exchangers in gas turbine applications
[BMFT-FB-T-78-51] N80-13266
Energy conservation via heat transfer enhancement
[COO-4649-4] N80-13707
HEAT FLUX
Experimental study of heat transfer from a yawed cylinder to air with a constant wall heat flux
[SAND-79-8022] N80-13005
HEAT PIPES
Heat pipe cooled power magnetics
[NASA-CR-159659] N80-13362
HEAT PUMPS
Design, construction, and operation of the solar assisted heat pump ground coupled storage experiments at Brookhaven National Laboratory
[BNL-25908] N80-13654
Community heating and cooling systems
[CONF-790446-6] N80-13706
HEAT RESISTANT ALLOYS
Creep behavior of precipitation and oxide dispersion strengthened superalloys
N80-13213
Characterization of an oxide dispersion strengthened superalloy, MA-6000E, for turbine blade applications --- turbine blade
[NASA-CR-159493] N80-13218
HEAT STORAGE
Low-temperature thermal energy storage program annual operating plan
[ORNL/TM-6934] N80-13631
Mathematical modeling of phase change processes for latent heat thermal energy storage
[ORNL/CSD-39] N80-13639
Case study of the Brownell low energy requirement house
[BNL-50968] N80-13651
Design, construction, and operation of the solar assisted heat pump ground coupled storage experiments at Brookhaven National Laboratory
[BNL-25908] N80-13654
Trans-seasonal storage of solar energy: Innovative research program subtask --- underground storage
[COO-4546-3] N80-13672
Large-scale annual-cycle thermal energy storage in aquifers
[CONF-790515-3] N80-13686
Cost analysis of packed beds for thermal energy storage
[CAES-11] N80-13687
HEAT TRANSFER
Experimental study of heat transfer from a yawed cylinder to air with a constant wall heat flux
[SAND-79-8022] N80-13005
A fundamental study of liquid spray evaporation at a heated surface
[NASA-CR-160409] N80-13405
Condensation and evaporation heat transfer with low-boiling temperature fluids --- for ocean thermal and geothermal energy conversion
[CONF-790539-1] N80-13412
Transient thermal effects in disc brakes
N80-13465
Heat transfer in lead-acid batteries
[CONF-7809102-1] N80-13641
Energy conservation via heat transfer enhancement
[COO-4649-4] N80-13707
Heat transfer in high-level waste management
[CONF-790822-1] N80-13919
HEAT TRANSFER COEFFICIENTS
Heat-transfer in helically coiled tubes with laminar flow
N80-13393
HEAT TRANSMISSION
Application of rapid solidification techniques to aluminum alloys --- mathematical model
[AD-A073443] N80-13223
Experimental and analytical OTEC studies at ORNL
[CONF-790631-1] N80-13666
HEAT TREATMENT
Chemistry and heat treatment effects on mechanical and microstructural properties of heat-treated, beta-extruded Ti-6Al-6V-2Sn
[BDX-613-2170-REV] N80-13224
Alloying and heat treatment optimization of Fe/Cr/C steels for improved mechanical properties
[LBL-9260] N80-13236
Characterization and properties of controlled nucleation thermochemical deposited [CNTD] silicon carbide
[NASA-TM-79277] N80-13254
Characterization of heat treatment induced changes in Li-NA beta-alumina single crystals
[CONF-790538-6] N80-13978
HEAVY IONS
Recent advances in design for low and medium-energy heavy ion accelerators
[CONF-790327-7] N80-13912
Low-cost RF system for a 2-megahertz heavy ion linear accelerator
[BNL-50960] N80-13914
BNL three-stage tandem accelerator facility --- discussion of systems engineering for heavy ions accelerator test facility
[BNL-26211] N80-13915
HELICAL WINDINGS
Heat-transfer in helically coiled tubes with laminar flow
N80-13393
HELICOPTER DESIGN
Computer description of Black Hawk helicopter
[AD-A073444] N80-13031
HELICOPTERS
Computer description of Black Hawk helicopter
[AD-A073444] N80-13031
Effect of noise spectra and a listening task upon passenger annoyance in a helicopter interior noise environment
[NASA-TP-1590] N80-13769
HELIOS 1
Contributions to the Fourth Solar Wind Conference --- conference, Burghausen, West Germany, 1978
[MPI-PAE/EXTRATERR-154] N80-14008
Initial results on solar wind alpha particle distributions as measured by Helios between 0.3 and 1 AU
N80-14010
Some characteristics of proton velocity distributions in the solar wind as observed by the Helios solar probes
N80-14011
Electron characteristics in the solar wind as deduced from Helios observations
N80-14012
HELIOS 2
Contributions to the Fourth Solar Wind Conference --- conference, Burghausen, West Germany, 1978
[MPI-PAE/EXTRATERR-154] N80-14008
Electron characteristics in the solar wind as deduced from Helios observations
N80-14012
HELIOSTATS
Solar thermal test facility heliostat development
[SAND-78-1177] N80-13642
Solar central receiver prototype heliostat CDRL item B.D., volume 1
[SAN-1605/7-VOL-1] N80-13700
HELIUM ISOTOPES
A study of the dissipative mechanism in the flow of superfluid helium-4 using charged vortex rings
N80-13314
Nuclear-pumped CO2 laser
N80-13440
HELIUM-NEON LASERS
CW nuclear pumped lasing of 3He-Ne
N80-13442
HEMATOPOIESIS
System parameters for erythropoiesis control model: Comparison of normal values in human and mouse model
[NASA-CR-160401] N80-13759

HEOS B SATELLITE
External plasma flow --- as observed by heos-2
N80-13533
HERMITIAN POLYNOMIAL
Piecewise cubic interpolation methods
[UCRL-81230] N80-13852
HETERODYNING
Heterodyne detection and generation of microwave radiation by superconducting microbridges in a resonant structure
N80-13954
HETEROJUNCTION DEVICES
Heterojunction materials and characteristics --- molecular structure study of gallium arsenides aluminum compounds heterojunction devices
[AD-A073792] N80-13365
HEURISTIC METHODS
Fault test generation for sequential circuits: A search directing heuristic
N80-13353
Computational experiments with zero-one programming algorithms and heuristics
N80-13800
Heuristic approaches to the decomposition of sparse matrices
N80-13810
HIGH FREQUENCIES
Investigation of high frequency oscillations in the OV102 elevon actuation subsystems using continuous system modeling program simulation
[NASA-CR-160407] N80-13151
HIGH POWER LASERS
Physical processes affecting the performance of high-power, frequency-doubled short-pulse laser systems: Analysis, simulation, and experiment
N80-13437
HIGH PRESSURE
High-pressure LOX/CH4 injector program
[NASA-CR-161342] N80-13161
Design, fabrication and delivery of a high pressure LOX-methane injector
[NASA-CR-161343] N80-13162
Analysis of the anode boundary layer of a high pressure-high current arc
N80-13358
Portable high-temperature, high-pressure viscometer development
[SAND-78-1409] N80-13433
Contributions of shock-wave physics to high-pressure standards --- high pressure measurements using shock waves
[LA-UR-79-2039] N80-13875
Photonic compression --- laser fusion to measure high pressure equations of state
[LA-UR-79-2040] N80-13973
HIGH SPEED
Economic study of multipurpose advanced high-speed transport configurations
[NASA-CR-159126] N80-13986
HIGH STRENGTH ALLOYS
Cyclic creep behavior of pure aluminum and 7050 aluminum alloy
N80-13214
HIGH STRENGTH STEELS
Initiation and growth of fatigue microcracks and strain-controlled fatigue properties in steel alloys: Microstructure and mechanics
N80-13508
HIGH TEMPERATURE
Elevated temperature exposure has significant effects on the structure of austenitic stainless steel welds
[CONF-790736-1] N80-13232
High temperature damping of dynamic systems --- dynamic stability of turbines through high temperature vibration damping
N80-13308
Portable high-temperature, high-pressure viscometer development
[SAND-78-1409] N80-13433
Time-dependent fracture of materials at elevated temperature --- conference
[CONF-790236] N80-13520
Development and evaluation of materials for high temperature lithium/sulfur rechargeable batteries
[DOE/TIC-10098] N80-13682
Hydride engines
[SAND-78-2303C] N80-13709
HIGH TEMPERATURE GAS COOLED REACTORS
Recommendation of a triaxial failure theory for graphite
[GA-A-15333] N80-13521
HIGH TEMPERATURE GASES
A thermogravimetric system for investigating gas-metal reactions at elevated temperatures
[AD-A073412] N80-13194
HIGH TEMPERATURE PLASMAS
First observations of the hot ion composition in the high altitude magnetospheric boundary layer by means of Prognoz-7
N80-13539
HISTOLOGY
Determining biological fine structure by differential absorption of soft X-ray
[BNL-26282] N80-13760
HOLLOW CATHODES
Primary electric propulsion technology study --- for thruster wear-out mechanisms
[NASA-CR-159688] N80-13158
HONEYCOMB STRUCTURES
Effects of cellular structure on the behavior of gaseous detonation waves under transient conditions
[UCRL-82270] N80-13411
HUGONIOT EQUATION OF STATE
Shock compression of liquid methane and the principle of corresponding states
[UCRL-82127] N80-13410
HUMAN BODY
Optimal design of open-linkage mechanical systems --- optimizing human performance
N80-13469
HUMAN FACTORS ENGINEERING
Aerodynamic characteristics of wheelchairs --- Langley V/STOL wind tunnel tests for human factors engineering
[NASA-TM-80191] N80-12999
Anti-suffocation valve Bendix type no. 3267010-0101
[AD-A068927] N80-13772
Aviation night vision goggle
[AD-A073296] N80-13773
An exploratory study of the cognitive structures underlying the comprehension of software design problems
[AD-A073727] N80-13821
HUMAN PERFORMANCE
Optimal design of open-linkage mechanical systems --- optimizing human performance
N80-13469
Reliability, validity and application of an improved scale for assessment of motion sickness severity
[AD-A069130] N80-13766
HUMAN REACTIONS
Effect of noise spectra and a listening task upon passenger annoyance in a helicopter interior noise environment
[NASA-TP-1590] N80-13769
HUMAN TOLERANCES
Effects of sound level fluctuations on annoyance caused by aircraft-flyover noise
[NASA-TP-1576] N80-13880
HURRICANES
The importance of eddy momentum flux in the dynamics of a hurricane: A numerical approach
N80-13741
HYBRID CIRCUITS
Design, processing and testing of LSI arrays, hybrid microelectronics task
[NASA-CR-161337] N80-13359
Development of two monolithic integrated circuits and a 10-kHz Tape Automated Bonded [TAB] hybrid microcircuit oscillator
[AD-A073565] N80-13368
HYDRAULIC EQUIPMENT
MERADCOM/OSU hydraulic system reliability program --- reliability analysis of hydraulic pumps and valves
[AD-A073789] N80-13493
HYDRIDES
Development of laboratory apparatus dedicated to the study of hydride-dehydride reactions
[SAND-78-1803] N80-13201
Design and development of a 30 watt solid polymer electrolyte fuel cell power source fueled with calcium hydride
[AD-A071157] N80-13625
Hydride engines
[SAND-78-2303C] N80-13709
HYDROBROMIDES
A purely chemical HBr laser
[AD-A060841] N80-13454
HYDROCARBON COMBUSTION
Low NO[x] heavy fuel combustor program
[NASA-TM-79313] N80-13624
An analytical study of nitrogen oxides and carbon monoxide emissions in hydrocarbon combustion with added nitrogen, preliminary results
[NASA-TM-79296] N80-13721
HYDROCARBON FUELS
Design and evaluation of high performance rocket engine injectors for use with hydrocarbon fuels
[NASA-TM-79319] N80-13163
HYDROCARBONS
The analysis of sediment samples for hydrocarbons
[AD-A073822] N80-13754
HYDRODYNAMICS
Space experiments on chemical pattern formation
N80-13109
HYDROELECTRIC POWER STATIONS
Solar thermal electric plants in hydroelectric grid --- Lower Colorado region
[DOE/SF/10505-1] N80-13663
Fundamental economic issues in the development of small-scale hydro
[DOE/RA-23-216.00.0-02] N80-13667
HYDROGEN
Multiplicity and stability of nonadiabatic hydrogen-oxygen-nitrogen flames --- mathematical models
N80-13185
Studies of premixed hydrogen flames --- flame extinction
N80-13190
Experimental study of hydrogen jet ignition and jet extinguishment --- breeder reactor safety
[HEDL-TME-78-80] N80-13198
Neutron spectroscopy of fast hydrogen diffusion in BCC transition metals
[BNL-26075] N80-13225
Hydrogen-halogen energy storage system
[BNL-50924] N80-13632
Laser driven breakdown-heating waves in magnetized hydrogen --- gas dissociation
N80-13933
HYDROGEN EMBRITTLEMENT
Specificity hydrogen and stress corrosion cracking in austenitic stainless steel
N80-13208
An adsorption study of hydrogen on iron and its relation to hydrogen embrittlement
N80-13209
Delayed failure of vanadium-hydrogen alloys
[COO-3459-15] N80-13227
Combined macroscopic and microscopic approach to the fracture of metals
[COO-3084-69] N80-13229
HYDROGEN ENGINES
Hydride engines
[SAND-78-2303C] N80-13709
HYDROGEN FUELS
Liquid hydrogen as an automotive fuel
[LA-UR-79-621] N80-13297
Critical review and assessment of environmental and safety problems in hydrogen energy systems
[LA-7820-PR] N80-13690
HYDROGEN IONS
An adsorption study of hydrogen on iron and its relation to hydrogen embrittlement
N80-13209
HYDROGEN OXYGEN FUEL CELLS
Design and development of a 30 watt solid polymer electrolyte fuel cell power source fueled with calcium hydride
[AD-A071157] N80-13625
HYDROGEN PRODUCTION
Synfuel [hydrogen] production from fusion power
[LA-UR-79-1115] N80-13296
HYDROGENATION
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels [riser cracking of coal]
[FE-2307-46] N80-13280
Catalyst development for coal liquefaction
[EPRI-AF-1084] N80-13292
HYDROGRAPHY
The fate of dissolved aluminum within the oceans
N80-13586
HYDROLYSIS
Conversion of biomass from agriculture into useful products --- cellulose hydrolysis and butanediol fermentation
[COO-4298-1] N80-13278
Coal conversion in flash hydropyrolysis reactors
[BNL-26209] N80-13294
HYDROSTATIC PRESSURE
Geopressure energy resource evaluation --- Texas and Louisiana
[ORNL/PPA-79/2] N80-13605
HYGROSCOPICITY
Hygrothermal damage mechanisms in graphite-epoxy composites
[NASA-CR-3189] N80-13170
Physical properties of gasoline/alcohol automotive fuels
[CONF-790520-4] N80-13273
HYPERSONIC AIRCRAFT
Aerothermal performance of radiatively and actively cooled panel at Mach 6.6
[NASA-TP-1595] N80-13402
HYPERSONIC FLOW
Three-dimensional viscous hypersonic flows over general bodies using shock-layer and parabolized Navier-Stokes equations
N80-12993
HYPOTHERMIA
Resuscitation from hypothermia: A literature review
[AD-A069093] N80-13764

I

IDAHO
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
IGNITION
Experimental study of hydrogen jet ignition and jet extinguishment --- breeder reactor safety
[HEDL-TME-78-80] N80-13198
IMAGE ENHANCEMENT
Two-dimensional sequential algorithms for image restoration and enhancement
N80-13354
High resolution astronomical imaging through the turbulent atmosphere
N80-13994
Figure control for a segmented telescope mirror
[LBL-8621] N80-13997
IMAGE FURNACES
Preparatory experiments for the growth of silicon single crystals in the mirror heating facility of Spacelab
N80-13079

IMAGE INTENSIFIERS
Aviation night vision goggle
[AD-A073296] N80-13773
IMAGE PROCESSING
Two-dimensional sequential algorithms for image restoration and enhancement
N80-13354
Digital processing of LANDSAT MSS and topographic data to improve capabilities for computerized mapping of forest cover types --- Colorado and Washington
[E80-10009] N80-13588
Earth observations division Earth resources data analysis capabilities
[E80-10013] N80-13592
Interactive aids for cartography and photo interpretation --- aerial photography
[AD-A073452] N80-13603
IMAGE RESOLUTION
High resolution astronomical imaging through the turbulent atmosphere
[AD-A073434] N80-13996
IMAGING TECHNIQUES
Acoustic techniques for measuring stress regions in materials
[EPRI-NP-1043] N80-13525
Image segmentation by statistical edge detection and sequential edge growing
N80-13831
Experimental FLIR study
[AD-A073361] N80-13926
IMPACT DAMAGE
Particle impact damage in silicon nitride, part 3
[AD-A073570] N80-13172
IMPACT LOADS
Analytical investigation of the landing dynamics of a large airplane with a load-control system in the main landing gear
[NASA-TP-1555] N80-13025
IMPACT TESTS
Identification of the elastic constants for composites using modal analysis
[SAND-79-0527C] N80-13176
Effects of soft foam insulation impact --- on shuttle orbiter high temperature reusable surface insulation tiles
[NASA-CR-160400] N80-13472
Hertzian fracture of Pyrex glass and alpha quartz
N80-13510
IMPEDANCE MATCHING
Nonlinear hardy spaces and electrical power transfer
N80-13837
IMPULSES
Auditory detection of bandpass-filtered impulses under various conditions of masking
N80-13877
IMPURITIES
deHass-vanAlphen measurements of spin resolved scattering in the Cu[Mn] magnetic impurity system
N80-13955
INDEXES [DOCUMENTATION]
World energy data system [WENDS]. Volume 8: Nuclear facility profiles, CO-HU
[ANL-PMS-79-2-VOL-8] N80-13630
National wind data index
[HCP/T1041-01] N80-13745
INDIANA
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
INDICATING INSTRUMENTS
Internal combustion engine sampling probes: A study of sample-gas origins, flow disturbances and quench-layer bias
N80-13468
INDIUM ALLOYS
Preparatory studies for an experiment in directional solidification of immiscible Al-In alloys on board a rocket vehicle
N80-13100
Transient phenomena in electron transport in semiconductors
[AD-A073009] N80-13966
INDIUM ANTIMONIDES
Structural and physical characteristics of InSb single crystals grown under near-zero gravity conditions
N80-13071
INDUCTION MOTORS
Induction and synchronous machines for vertical axis wind turbines
[SAND-79-7017] N80-13675
INDUSTRIAL ENERGY
Process optimization of industrial energy use
[BNL-26482] N80-13650
Technology development needs for high temperature process heat
[SERI/TR-35-047] N80-13669
Industrial applications of advanced energy systems
[CONF-790602-54] N80-13708
INDUSTRIES
Laser induced photochemistry
[SAN-115/136-1] N80-13203
INELASTIC COLLISIONS
New methods for quantum mechanical calculations of inelastic atom-molecule collisions and electron scattering
N80-13892
INELASTIC SCATTERING
Measurement of the inelastic x-ray scattering cross section of neon with synchroton radiation
N80-13889
Vector current scattering in two dimensional quantum chromodynamics
[LBL-9022] N80-13907
INERT ATMOSPHERE
Crystal growth from the vapor phase with an inert component present
N80-13075
INERTIA
Application of inertia welding technology to steel disc-type flywheels
[UCRL-15045] N80-13652
INERTIAL REFERENCE SYSTEMS
Investigations on the hierarchy of reference frames in geodesy and geodynamics
[NASA-CR-162499] N80-13731
INERTIAL UPPER STAGE
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160404] N80-13334
INFORMATION MANAGEMENT
A structured logical database design methodology, volumes 1 and 2
N80-13781
INFORMATION RETRIEVAL
The transfer of information and authority in a protection system
[AD-A073370] N80-13791
INFORMATION SYSTEMS
British Post Office VIEWDATA interfacing to a data communication network
[NPL-DNACS-1/78] N80-13343
Texas applications system verification and transfer remote sensing information subsystem: Functional design
[E80-10017] N80-13596
A specification of data structures with application to data base systems
N80-13782
INFRARED PHOTOGRAPHY
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
INFRARED RADIATION
Broadly tunable picosecond IR source
[LA-UR-79-1474] N80-13928
INFRARED SCANNERS
Experimental FLIR study
[AD-A073361] N80-13926
INFRARED SPECTRA
Lidar observations at 0.7-micrometers and 10.6-micrometers wavelengths during dusty infrared test I [DIRT I]
[AD-A073330] N80-13340
INFRARED SPECTROSCOPY
Quantitative gas analysis using Fourier transform infrared spectroscopy
[SAND-79-0968] N80-13202
Infrared absorption of spectroscopy of carbon monoxide on nickel films: A low temperature thermal detection technique
[LBL-8482] N80-13239
INFRASONIC FREQUENCIES
A theory for the asymmetry in the auroral ionization density profile for the generation of auroral infrasonic waves
N80-13729
INHOMOGENEITY
Solution of the initial value problem and energy redistribution for electron and Alfven waves in inhomogeneous plasmas
[REPT-78-115] N80-13945
INJECTORS
Atomizing characteristics of swirl can combustor modules with swirl blast fuel injectors --- in terms of NOX emission rate
[NASA-TM-79297] N80-13047
High-pressure LOX/CH4 injector program
[NASA-CR-161342] N80-13161
Design, fabrication and delivery of a high pressure LOX-methane injector
[NASA-CR-161343] N80-13162
Design and evaluation of high performance rocket engine injectors for use with hydrocarbon fuels
[NASA-TM-79319] N80-13163
INLET PRESSURE
Evaluation of airjet distortion generator used to produce steady-state, total-pressure distortion at the inlet of a General Electric F101-GE-100 turbofan engine
[AD-A072743] N80-13049
INSOLATION
Solar-climactic statistical study --- windpower utilization and solar energy conversion
[HCP/T4016-01/2] N80-13747
INSTRUMENT ERRORS
Flight test of navigation and guidance sensor errors measured on STOL approaches
[NASA-TM-81154] N80-13041
Instrument error analysis as it applies to windtunnel testing
[NASA-TP-1572] N80-13430
Notes on the transient responses and errors of shock accelerometers with second-order filters
[RAE-TM-IT-179] N80-13435
INSTRUMENT LANDING SYSTEMS
Establishment criteria for Distance Measurement Equipment [DME] with instrument landing system and/or localizer approach
[AD-A069818] N80-13016
In-service improvements and modernization of all components of the instrument landing systems. Volume 1: Sections 1-10
[AD-A074425] N80-13018
In-service improvements and modernization of all components of the instrument landing systems. Volume 2: Sections 11 and 12
[AD-A074426] N80-13019
A new weighting coefficient for adaptive state estimation
N80-13347
INSTRUMENT PACKAGES
Guidelines for mission integration, a summary report
[NASA-CR-161347] N80-13067
A container for conditioning space experiments
N80-13093
Engineering evaluation of existing space hardware for utilization in small self-contained payloads
N80-13094
Development of in situ marine seismic and geotechnical instrumentation systems
[SAND-79-0868C] N80-13431
INSULATION
Effects of soft foam insulation impact --- on shuttle orbiter high temperature reusable surface insulation tiles
[NASA-CR-160400] N80-13472
Development and evaluation of materials for high temperature lithium/sulfur rechargeable batteries
[DOE/TIC-10098] N80-13682
INSULATORS
Study of the physics of insulating films as related to the reliability of metal-oxide semiconductor devices
[AD-A073300] N80-13364
Dipolar defect structure of laser and other transparent materials --- study of dielectric properties of insulators
[AD-A073815] N80-13458
INTEGRAL EQUATIONS
Improved boundary-integral equation method for time-dependent inelastic deformation in metals
[COO-2733-20] N80-13230
Numerical solution of two-dimensional potential theory problems using integral equation techniques
N80-13835
INTEGRATED CIRCUITS
A functional simulation system for MSI and LSI systems
N80-13346
Process oriented design aids for very large scale integrated circuits
N80-13348
Development of two monolithic integrated circuits and a 10-kHz Tape Automated Bonded [TAB] hybrid microcircuit oscillator
[AD-A073565] N80-13368
Latch-up and radiation integrated circuit--LURIC: A test chip for CMOS latch-up investigation
[SAND-78-1540] N80-13369
Latch-up control in CMOS integrated circuits
[SAND-79-0646C] N80-13382
Computer aided design of microcircuits. Citations from the NTIS data base
[NTIS/PS-79/0870/0] N80-13388
GaAs waveguide detector array for an IOC spectrum analyzer
[AD-A073552] N80-13924
INTEGRATED ENERGY SYSTEMS
Assessment of Stirling engine potential in total and integrated energy systems
[ANL/ES-76] N80-13636
Community heating and cooling systems
[CONF-790446-6] N80-13706
INTERCOSMOS SATELLITES
Czechoslovakian preliminary program of material research in space
N80-13095
INTERFACES
Spacelab interface development test, volume 1, sections 1-6
[NASA-CR-160411] N80-13149
INTERFACIAL ENERGY
Fundamental experiments on interfacial convection: Project TEXUS 1 and 2
N80-13102
INTERFACIAL TENSION
The parachor and the P yields O bond
[AD-A073410] N80-13168
Phase behavior and interfacial tension studies of surfactant systems
N80-13395

Marangoni bubble motion in zero gravity --- Lewis zero gravity drop tower
[NASA-TM-79230] N80-13403
INTERFERENCE GRATING
Surface-wave scattering by dielectric gratings with arbitrary profiles
N80-13964
INTERMODULATION
Mathematical problems arising from passive intermodulation interference in communications satellites
N80-13321
INTERNAL COMBUSTION ENGINES
Evaluation of methanol for reduced exhaust emissions in a single-cylinder research engine
[CONF-790520-3] N80-13276
Internal combustion engine sampling probes: A study of sample-gas origins, flow disturbances and quench-layer bias
N80-13468
Hybrid random choice method with application to internal combustion engines 2 --- solving cylindrically or spherically symmetric flow equations
[LBL-9423] N80-13477
INTERNATIONAL SUN EARTH EXPLORER 1
Quasistatic electric fields observed during a number of magnetopause crossings by ISEE-1
N80-13535
INTERNATIONAL SUN EARTH EXPLORER 2
Ion and electron layers at the magnetopause: ISEE-2
N80-13545
INTERNATIONAL SUN EARTH EXPLORERS
The nuclear and ionic charge distribution particle experiments on the ISEE-1 and ISEE-C spacecraft
[BMFT-FB-W-78-38] N80-13132
INTERPLANETARY MAGNETIC FIELDS
Birkeland currents and the interplanetary magnetic field
N80-13554
Influence of the interplanetary magnetic field on the position of the dayside magnetopause
N80-13570
INTERPLANETARY SPACE
Energetic electron bursts in the magnetopause electron layer and in interplanetary space
N80-13544
INTERPOLATION
Piecewise cubic interpolation methods
[UCRL-81230] N80-13852
INTERSTITIALS
Interstitial-impurity trapping in Al-Fe and Al-Zn
[COO-1198-1267] N80-13975
INVARIANCE
Invariant tests for scale parameters under elliptical symmetry
N80-13855
Invariant subspaces associated with decomposition
N80-13874
INVENTORY CONTROLS
Extensions of a simple model with applications in reliability, extinction of species, inventory depletion and urn sampling
[AD-A073814] N80-13492
INVERTED CONVERTERS [DC TO AC]
Classification and technical review of dc-ac inverters for use in photovoltaic power systems
[COO-4094-25] N80-13377
IODINE LASERS
Nuclear pumped laser research at the Jet Propulsion Laboratory
N80-13450
ION ACCELERATORS
Generation and control of a slow space charge wave on a high current electron beam and its potential as a collective ion accelerator
N80-13900
Recent advances in design for low and medium-energy heavy ion accelerators
[CONF-790327-7] N80-13912
Low-cost RF system for a 2-megahertz heavy ion linear accelerator
[BNL-50960] N80-13914
BNL three-stage tandem accelerator facility --- discussion of systems engineering for heavy ions accelerator test facility
[BNL-26211] N80-13915
ION ACOUSTIC WAVES
Ion sound turbulence in the solar wind
N80-14009
ION BEAMS
Primary electric propulsion technology study --- for thruster wear-out mechanisms
[NASA-CR-159688] N80-13158
ION CURRENTS
Properties of single crystal beta-aluminas
[CONF-790538-9] N80-13977
ION CYCLOTRON RADIATION
A wave-particle-wave interaction observed on GEOS-2
N80-13543
ION ENGINES
Primary electric propulsion technology study --- for thruster wear-out mechanisms
[NASA-CR-159688] N80-13158
ION EXCHANGING
Reactions between glass melts
N80-13101
ION IMPLANTATION
Lifetime control in silicon through focused laser beam damage
[AD-A072909] N80-13455
ION INJECTION
Ion composition in the Dayside Cusp: Injection of ionospheric ions into the high latitude boundary layer
N80-13553
ION IRRADIATION
Effect of phase instabilities on the correlation of nickel ion and neutron irradiation swelling in solution annealed 316 stainless steel
[CONF-790657-2] N80-13226
ION MOTION
Ion and electron layers at the magnetopause: ISEE-2
N80-13545
ION PROPULSION
Heat pipe cooled power magnetics
[NASA-CR-159659] N80-13362
IONIC COLLISIONS
K-L and L-K vacancy sharing in ion-atom collisions
[UCRL-81947] N80-13894
IONIC WAVES
Critical level behavior of ion-cyclotron waves at magnetospheric boundary layers
N80-13542
IONIZATION
Studies of ionization processes --- laser applications for study of chemical energy and reaction kinetics in molecular ions
[AD-A073823] N80-13195
IONIZING RADIATION
Effects of ionizing radiation on the light sensing elements of the retina
[LBL-5683] N80-13767
IONOSPHERE
Effects of rocket exhaust products in the thermosphere and ionosphere
[LA-7926-MS] N80-13167
Radar measurements of temperatures and ionic composition in the high-latitude ionosphere
N80-13728
IONOSPHERIC COMPOSITION
Ion composition in the Dayside Cusp: Injection of ionospheric ions into the high latitude boundary layer
N80-13553
Radar measurements of temperatures and ionic composition in the high-latitude ionosphere
N80-13728
Report on French research into the ionosphere-magnetosphere from 1975 to 1978
[CRPE-DT-1039] N80-13738
IONOSPHERIC CURRENTS
Ionospheric convection at high latitudes
N80-13551
Interaction between the magnetospheric boundary layers and the ionosphere
N80-13579
IONOSPHERIC ELECTRON DENSITY
Studies on the thermosphere and ionosphere based on a detailed analysis of topside ionograms
[BMFT-FB-W-78-01] N80-13736
IONOSPHERIC ION DENSITY
A theory for the asymmetry in the auroral ionization density profile for the generation of auroral infrasonic waves
N80-13729
IONOSPHERIC SOUNDING
Studies on the thermosphere and ionosphere based on a detailed analysis of topside ionograms
[BMFT-FB-W-78-01] N80-13736
IONS
The nuclear and ionic charge distribution particle experiments on the ISEE-1 and ISEE-C spacecraft
[BMFT-FB-W-78-38] N80-13132
IRON
An adsorption study of hydrogen on iron and its relation to hydrogen embrittlement
N80-13209
Strain hardening and ductility of iron: Axisymmetric vs. plane strain elongation
[COO-4072-2] N80-13234
Iron line emission from the Alfven shell in X-ray binaries
[PR-450] N80-13998
IRON ALLOYS
Unidirectional solidification of eutectic iron-carbon alloys and the segregation of sulfur
N80-13085
The rate of dissociation of CO2 on liquid iron and nickel
N80-13215
X-ray measurement of carbon-caused atomic displacements in Fe-Ni-C martensite
N80-13217
IRON COMPOUNDS
Development of a lithium alloy/iron disulfide, 60-minute primary thermal battery
[SAND-79-0814] N80-13684
ISIS SATELLITES
Studies on the thermosphere and ionosphere based on a detailed analysis of topside ionograms
[BMFT-FB-W-78-01] N80-13736
ISIS-B
Comments on the low-altitude optical signatures of magnetospheric boundary layers
N80-13556
ISOPYCNIC PROCESSES
Isopycnal transport by the Antarctic circumpolar current and the Antarctic influence at intermediate water densities
N80-13752
ISOTHERMAL PROCESSES
Functional performance of the isothermal heating facility for the material science double rack
N80-13091
ISOTROPIC MEDIA
Kinetic theory of the boundary layer between a flowing isotropic plasma and a magnetic field
N80-13567
ITALY
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
ITERATION
An orbital localization method and an iterative procedure for calculating nuclear magnetic resonance coupling constants
N80-13189
ITERATIVE SOLUTION
An iterative unfolding technique
[ARWE-O-25/79] N80-13853

J

JET AIRCRAFT NOISE
A review of the research at NGTE concerning the effects of flight on engine exhaust noise
[NGTE-R-78007] N80-13887
JET BOUNDARIES
Two-dimensional jet boundary interaction for submerged thermal discharges
N80-13390
JET ENGINE FUELS
Airflow effects on fires, part 2
[AD-A073486] N80-13196
Comparative evalution of firefighting foam agents --- extinguishing Jet A fuel fires
[AD-A074490] N80-13253
JET FLOW
Transonic aerodynamic characteristics of a supersonic cruise aircraft research model with the engines suspended above the wing
[NASA-TM-80145] N80-12997
Mathematical modeling of the breakup of laminar capillary jets
N80-13399
JOSEPHSON JUNCTIONS
Planar Josephson junction radiation detector
N80-13958
JUPITER ATMOSPHERE
Jupiter's magnetopause
N80-13558
The Jovian boundary layer as formed by magnetic-anomaly effects
N80-13559
Earth and Jupiter: Comparison of magnetopause structure
N80-13560
JUPITER PROBES
System definition study for a German contribution to the Jupiter Orbiter Probe project
[BMFT-FB-W-78-24] N80-13128

K

KANSAS
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study --- Kansas
[E80-10012] N80-13591
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
KAONS
Polarization parameter measurement for K+p elastic scattering below 1 Ge/V/c
N80-13959
KELVIN-HELMHOLTZ INSTABILITY
Instabilities of accretion disk: Magnetosphere interfaces
N80-13562
Magnetopause Kelvin-Helmholtz instability
N80-13575
KERNEL FUNCTIONS
Control kernels and constant-rate jump processes
N80-13836

KINETIC FRICTION
Wear, friction, and temperature characteristics of an aircraft tire undergoing braking and cornering
[NASA-TP-1569] N80-13013
KINETIC THEORY
A fluid mechanical-kinetic theory description of a spherically symmetric discharge in a neutral medium
N80-13464
Kinetic theory of the boundary layer between a flowing isotropic plasma and a magnetic field
N80-13567
Kinetic theory of ballooning instabilities --- kinetic theory of magnetohydrodynamic stability of collisional plasmas
N80-13932

L

LABORATORIES
Laboratory design for modern analytical instruments
[CONF-790702-1] N80-13434
LABORATORY EQUIPMENT
The multipurpose apparatus Crystal for process experiments in space
N80-13070
The fluid physics module: A contribution to materials science and physics in space
N80-13087
Process chamber: Payload element of the German microgravity mission D 1
N80-13090
Development of laboratory apparatus dedicated to the study of hydride-dehydride reactions
[SAND-78-1803] N80-13201
Laboratory design for modern analytical instruments
[CONF-790702-1] N80-13434
LAKES
Dissolved organic matter and lake metabolism
[COO-1599-153-PT-1] N80-13604
LAMINAR FLOW
Heat-transfer in helically coiled tubes with laminar flow
N80-13393
Mathematical modeling of the breakup of laminar capillary jets
N80-13399
LAMINATES
Fracture toughness of graphite/epoxy composite laminates enhanced by the intermittent interlaminar bonding strength
N80-13169
LAND ICE
The ocean tide and waves beneath the Ross Ice Shelf, Antarctica
N80-13751
LAND USE
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
Wetland values concepts and methods wetlands evaluation
[AD-A069088] N80-13602
LANDING GEAR
Analytical investigation of the landing dynamics of a large airplane with a load-control system in the main landing gear
[NASA-TP-1555] N80-13025
Friction characteristic of steel skids equipped with skegs on a lakebed surface --- landing gear
[NASA-TM-81347] N80-13027
LANGUAGE PROGRAMMING
Building efficient pass-oriented attribute grammar evaluators
N80-13796
LARGE AREA CROP INVENTORY EXPERIMENT
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study --- Kansas
[E80-10012] N80-13591
Earth observations division Earth resources data analysis capabilities
[E80-10013] N80-13592
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
LARGE SCALE INTEGRATION
A functional simulation system for MSI and LSI systems
N80-13346
Process oriented design aids for very large scale integrated circuits
N80-13348
Design, processing and testing of LSI arrays, hybrid microelectronics task
[NASA-CR-161337] N80-13359
LARGE SPACE STRUCTURES
Space construction system analysis, final review. Part 1: Executive summary
[NASA-CR-160286] N80-13063
LASER APPLICATIONS
Studies of ionization processes --- laser applications for study of chemical energy and reaction kinetics in molecular ions
[AD-A073823] N80-13195
Laser induced photochemistry
[SAN-115/136-1] N80-13203
Laser ignition of solid propellant formulations
[AD-A073316] N80-13270
Application of coatings by high energy CW lasers
[AD-A073347] N80-13456
LASER FUSION
Photonic compression --- laser fusion to measure high pressure equations of state
[LA-UR-79-2040] N80-13973
LASER HEATING
Laser driven breakdown-heating waves in magnetized hydrogen --- gas dissociation
N80-13933
Multiple-pass carbon dioxide laser heating of a theta-pinch plasma
N80-13936
LASER MODES
Multiple-photon excitation of polyatomic molecules in a strong optical field: A universal normalization
[LA-UR-79-1524] N80-13896
LASER OUTPUTS
Nuclear pumping mechanisms in atomic carbon and in excimers
N80-13445
Transmission of free-running laser pulses of high energy and power densities through previously gamma radiated fiber waveguides
[SAND-79-0441] N80-13462
LASER PLASMA INTERACTIONS
Multiple-pass carbon dioxide laser heating of a theta-pinch plasma
N80-13936
LASER PLASMAS
University of Florida nuclear pumped laser program --- excitation of laser gaseous
N80-13439
LASER TARGETS
Effect of deviations from the Maxwell distribution on neutron production in laser targets
[LA-7532-MS] N80-13460
LASERS
Dipolar defect structure of laser and other transparent materials --- study of dielectric properties of insulators
[AD-A073815] N80-13458
Time dependent propagation of high-energy laser beams through the atmosphere, 4
[UCRL-52654] N80-13461
LASING
CW nuclear pumped lasing of 3He-Ne
N80-13442
LATERAL STABILITY
Stability problems on rotor systems --- rotary stability and lateral stability phenomena due to self induced vibration
N80-13301
LATTICE PARAMETERS
Loss of lattice rigidity in austenite
[AD-A073280] N80-13221
LAUNCH VEHICLES
Development and evaluation of an ablative closeout material for solid rocket booster thermal protection system
[NASA-TM-78241] N80-13258
LEAD ALLOYS
The preparation and stability of metallic emulsions in a microgravity environment: An experiment for the First Spacelab Payload [FSLP]
N80-13081
LEAD OXIDES
Heat transfer in lead-acid batteries
[CONF-7809102-1] N80-13641
LEAD TITANATES
Lead zirconate titanate [LZT] ceramics
[AD-A073564] N80-13259
LEADING EDGES
Exploratory study of the effects of wing-leading-edge modifications on the stall/spin behavior of a light general aviation airplane
[NASA-TP-1589] N80-13026
LEAST SQUARES METHOD
Least squares, adaptive-lattice algorithms
[AD-A073464] N80-13846
Asymptotic theory for process least squares estimators for diffusion processes
[AD-A073577] N80-13864
Controlling magnetic field profiles
[SAND-79-0678] N80-13876
A new method for the design of recursive digital filters and its fields of application
[ESA-TT-530-REV] N80-13930
LENSES
Mounting procedure for high quality optical systems
[BMFT-FB-T-78-19] N80-13929
LEPTONS
Phenomenology of heavy leptons and heavy quarks
[SLAC-PUB-2226] N80-13904
LIFE [DURABILITY]
Primary electric propulsion technology study --- for thruster wear-out mechanisms
[NASA-CR-159688] N80-13158
Gas generator research and development: BI-GAS process
[FE-1207-62] N80-13288
Lifetime control in silicon through focused laser beam damage
[AD-A072909] N80-13455
LIFE SCIENCES
Life science payloads planning study integration facility survey results
[NASA-CR-160390] N80-13064
Life science payloads planning study integration facility survey: Executive summary
[NASA-CR-160391] N80-13065
LIGHT AIRCRAFT
Evaluation of seating and restraint systems conducted during fiscal year 1978
[AD-A074881] N80-13014
Exploratory study of the effects of wing-leading-edge modifications on the stall/spin behavior of a light general aviation airplane
[NASA-TP-1589] N80-13026
Exhaust emissions characteristics for a general aviation light aircraft Teledyne Continental Motors 6-285-B piston engine
[AD-A074338] N80-13042
LIGHT EMISSION
Plasma cleaning end-of-process detection --- using optical emission techniques
[BDX-613-2229-REV] N80-13384
Comments on the low-altitude optical signatures of magnetospheric boundary layers
N80-13556
LIGHT SCATTERING
Metal silver-liquid interface: Oxide properties from reflectance and scattered light spectroscopy
[COO-4381-7] N80-13235
Photopolarimetry of scattering surfaces and their interpretation by computer model
[NASA-CR-162514] N80-14002
LIGHT SOURCES
Anti-Stokes emission as a VUV and soft X-ray source
[NASA-CR-162266] N80-13923
LIGHT TRANSMISSION
Lidar observations at 0.7-micrometers and 10.6-micrometers wavelengths during dusty infrared test 1 [DIRT I]
[AD-A073330] N80-13340
LIGHT WATER
Spent fuel receipt and lag storage facility for the spent fuel handling and packaging program --- structural design criteria for light waste water disposal storage
[DPSTD-SFHP-78-10] N80-13905
LIGHTNING
Electrical discharges in the Venus atmosphere
[D-272] N80-14006
LIGNIN
Evaluation of polar and non-polar plastics compounded with thermomechanical wood fibers
N80-13247
LIMITS [MATHEMATICS]
Limit theorems for the reliability of series-parallel load-sharing systems
N80-13487
LINE SPECTRA
Iron line emission from the Alfven shell in X-ray binaries
[PR-450] N80-13998
LINEAR ACCELERATORS
Low-cost RF system for a 2-megahertz heavy ion linear accelerator
[BNL-50960] N80-13914
LINEAR CIRCUITS
Reliability test and evaluation of MIL-M-38510 linear microcircuits
[AD-A073455] N80-13363
LINEAR EQUATIONS
Heuristic approaches to the decomposition of sparse matrices
N80-13810
LINEAR PREDICTION
Numerical and experimental simulation of microgravity-convection
N80-13112

LINEAR PROGRAMMING
Superlinearly globally convergent algorithms for nonlinear programming via sequential linear programs
N80-13808
LINEAR SYSTEMS
Dynamic edge dislocation displacements and Peierls strains in a linear elastic strip
[UCRL-52787] N80-13523
LINEARITY
Application of finite element programs APES, ASAS and MARC to linear fracture mechanics
[LTR-ST-1118] N80-13511
LINEARIZATION
Aerodynamic preliminary analysis system. Part 1: Theory --- linearized potential theory
[NASA-CR-145284] N80-12998
LINES OF FORCE
The formation and properties of boundary layers downstream from neutral lines in an open magnetosphere
N80-13572
LIQUID COOLING
Solidification of highly undercooled liquid metals and alloys
N80-13118
LIQUID HYDROGEN
Liquid hydrogen as an automotive fuel
[LA-UR-79-621] N80-13297
Charge carrier mobility and transmission across the liquid-vapor interface for the dielectric liquid hydrogen
N80-13899
LIQUID INJECTION
Energy saving in injection molding
[NEL-662] N80-13318
LIQUID METALS
Solidification of highly undercooled liquid metals and alloys
N80-13118
An experimental method for determination of mass transport in liquid metals to be applied under microgravity
N80-13120
The rate of dissociation of CO2 on liquid iron and nickel
N80-13215
LIQUID NITROGEN
Synthesis of a control model for a liquid nitrogen cooled, closed circuit, cryogenic nitrogen wind tunnel and its validation
[NASA-CR-162508] N80-13058
LIQUID OXYGEN
High-pressure LOX/CH4 injector program
[NASA-CR-161342] N80-13161
Design, fabrication and delivery of a high pressure LOX-methane injector
[NASA-CR-161343] N80-13162
LIQUID PHASES
Chromium doped semi-insulating gallium arsenide grown by liquid phase epitaxy
N80-13949
LIQUID PROPELLANT ROCKET ENGINES
Analysis of combustion instability in liquid fuel rocket motors
[NASA-CR-159733] N80-13164
Amplification of Reynolds number dependent processes by wave distortion --- liquid fuel combustor stability
[NASA-CR-159732] N80-13193
LIQUID ROCKET PROPELLANTS
Analysis of combustion instability in liquid fuel rocket motors
[NASA-CR-159733] N80-13164
Stability analysis of a liquid fuel annular combustion chamber
[NASA-CR-159734] N80-13165
LIQUID-LIQUID INTERFACES
Fundamental experiments on interfacial convection; Project TEXUS 1 and 2
N80-13102
The gradient theory of fluid interfaces
N80-13394
LIQUID-SOLID INTERFACES
Metal silver-liquid interface: Oxide properties from reflectance and scattered light spectroscopy
[COO-4381-7] N80-13235
LIQUID-VAPOR INTERFACES
The gradient theory of fluid interfaces
N80-13394
Charge carrier mobility and transmission across the liquid-vapor interface for the dielectric liquid hydrogen
N80-13899
LIQUIDS
Examination and selection of suitable methods for measuring the thermal conductivity of liquids in Spacelab
[BMFT-FB-W-78-09] N80-13207
LITHIUM
Characterization of heat treatment induced changes in Li-NA beta-alumina single crystals
[CONF-790538-6] N80-13978
LITHIUM ALLOYS
Development of a lithium alloy/iron disulfide, 60-minute primary thermal battery
[SAND-79-0814] N80-13684
LITHIUM COMPOUNDS
Development of porous sintered-ceramic separators for application in a Li-Al/LiCl-KCl/FeS battery
[CONF-790526-2] N80-13683
Engineering development of lithium/metal sulfide battery technology for vehicle propulsion
[ANL-79-1] N80-13685
LITHIUM SULFUR BATTERIES
Development and evaluation of materials for high temperature lithium/sulfur rechargeable batteries
[DOE/TIC-10098] N80-13682
LOAD DISTRIBUTION [FORCES]
A-10 carriage loads test
[AD-A073442] N80-13034
LOAD TESTING MACHINES
A testing machine which fulfills fixed boundary displacement conditions
[TRITA-HFL-0022] N80-13528
LOAD TESTS
Comparison tests and experimental compliance calibration of the proposed standard round compact plane strain fracture toughness specimen
[NASA-TM-81379] N80-13513
LOADING MOMENTS
Limit theorems for the reliability of series-parallel load-sharing systems
N80-13487
LOADS [FORCES]
Digital load control applied to full-scale airframe fatigue tests
[AD-A073588] N80-13054
Approximate techniques for plastic deformation of structures under impulsive loading, 2
N80-13313
Finite element linear models for symmetrically loaded thin shells of revolution
[LA-UR-79-1321] N80-13515
LOGIC CIRCUITS
Process oriented design aids for very large scale integrated circuits
N80-13348
LOGIC DESIGN
Rom-based sequential circuits: An alternative approach to conventional logic design
[SAND-78-2333] N80-13370
Generating correct programs from logic specifications
N80-13799
LOGICAL ELEMENTS
A functional simulation system for MSI and LSI systems
N80-13346
LONG DURATION EXPOSURE FACILITY
A container for conditioning space experiments
N80-13093
LONGITUDINAL STABILITY
Effects of relaxed static longitudinal stability on a single-stage-to-orbit vehicle design
[NASA-TP-1594] N80-13052
LORENTZ GAS
Studies in molecular dynamics of the friction coefficient and the Lorentz gas
[UCRL-52815] N80-13895
LOUISIANA
Geopressure energy resource evaluation --- Texas and Louisiana
[ORNL/PPA-79/2] N80-13605
LOW ALTITUDE
Comments on the low-altitude optical signatures of magnetospheric boundary layers
N80-13556
Low frequency waves and irregularities in the low altitude boundary layer
N80-13557
LOW COST
Low cost solar cells based on amorphous silicon electrodeposited from organic solvents
[SAN-0113-T3] N80-13678
LOW DENSITY MATERIALS
Comparative evalution of firefighting foam agents --- extinguishing Jet A fuel fires
[AD-A074490] N80-13253
LOW FREQUENCIES
Low frequency waves and irregularities in the low altitude boundary layer
N80-13557
LOW PASS FILTERS
Digital filtering techniques for use in minicomputers
[Y-2184] N80-13380
Notes on the transient responses and errors of shock accelerometers with second-order filters
[RAE-TM-IT-179] N80-13435
LOW SPEED STABILITY
Summary of low-speed longitudinal aerodynamics of two powered close-coupled wing-canard fighter configurations --- conducted in Langley C/STOL tunnel
[NASA-TP-1535] N80-12994
LOW SPEED WIND TUNNELS
Effects of fuselage forebody geometry on low-speed lateral-directional characteristics of twin-tail fighter model at high angles of attack
[NASA-TP-1592] N80-13002
Air flow measurements in a large irregularly shaped tunnel using anemometer and pitot-static tube traverse
[NEL-660] N80-13061
LOWER IONOSPHERE
A theory for the asymmetry in the auroral ionization density profile for the generation of auroral infrasonic waves
N80-13729
LUNAR SURFACE
Space environment and lunar surface processes
[NASA-CR-160363] N80-14003
LUNAR TIDES
Satellite contributions to tidal studies
[TUM-MITT-147] N80-13583
LUNGS
Modeling studies of the pressure-flow relationship of the central airways
N80-13763
LUXEMBOURG
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598

M

MAGNETIC ANOMALIES
The Jovian boundary layer as formed by magnetic-anomaly effects
N80-13559
MAGNETIC CIRCUITS
Birkeland currents and the interplanetary magnetic field
N80-13554
MAGNETIC CORES
Heat pipe cooled power magnetics
[NASA-CR-159659] N80-13362
MAGNETIC DIPOLES
Eight-tesla synchroton dipoles: Design alternatives
[LBL-8410] N80-13376
MAGNETIC DISKS
TFILE: A user callable tape file archiving system for NOS
[SAND-78-2022] N80-13829
MAGNETIC FIELD CONFIGURATIONS
The influence of ceramic permanent magnets on the armature of a small potential dc motor
[REPT-1631] N80-13386
Global aspects of the Earth's magnetopause
N80-13530
Magnetopause electric and magnetic field signatures at times of magnetospheric compressions
N80-13536
MAGNETIC FIELDS
Shock-induced electrical switching in polymeric films
[CONF-790540-11] N80-13264
Kinetic theory of the boundary layer between a flowing isotropic plasma and a magnetic field
N80-13567
Controlling magnetic field profiles
[SAND-79-0678] N80-13876
Laser driven breakdown-heating waves in magnetized hydrogen --- gas dissociation
N80-13933
MAGNETIC FLUX
ISEE-1 and 2 magnetometer observations of the magnetopause
N80-13534
MAGNETIC MEASUREMENT
A low energy electron magnetometer
[NASA-TM-80172] N80-13429
MAGNETIC PROPERTIES
Studies in structure and magnetic short range order. 1: Structure in amorphous germanium. 2: Magnetic interactions in gadolinum gallium garnet
N80-13956
MAGNETIC SIGNATURES
Magnetopause electric and magnetic field signatures at times of magnetospheric compressions
N80-13536
Low-altitude signatures of the boundary layers
N80-13550
MAGNETIC STARS
The magnetospheres of magnetic A stars and of pulsars
N80-13565
MAGNETIC STORMS
Observations of ion and electron distributions during the July 29 and July 30, 1977 storm period
N80-13540
Dayside aurora and substorm current systems
N80-13555
MAGNETIC TAPES
TFILE: A user callable tape file archiving system for NOS
[SAND-78-2022] N80-13829
MAGNETO-OPTICS
Difference frequency mixing in insulating GaAs and magnetooptical studies in Hg0.89Mno.11Te
N80-13952
MAGNETOHYDRODYNAMIC FLOW
External plasma flow --- as observed by heos-2
N80-13533
MAGNETOHYDRODYNAMIC GENERATORS
Effects of metallurgical microstructure of armatures on compressed magnetic field generators
[SAND-79-0890C] N80-13375

MAGNETOHYDRODYNAMIC STABILITY
A microscopic description of interpenetrated plasma regions
N80-13568
Kinetic theory of ballooning instabilities --- kinetic theory of magnetohydrodynamic stability of collisional plasmas
N80-13932
The study of MHD instabilities in elongated tokamaks --- plasma control
N80-13935
MAGNETOHYDRODYNAMIC WAVES
Solution of the initial value problem and energy redistribution for electron and Alfven waves in inhomogeneous plasmas
[REPT-78-115] N80-13945
Iron line emission from the Alfven shell in X-ray binaries
[PR-450] N80-13998
MAGNETOHYDRODYNAMICS
Towards a more quantitative understanding of dayside magnetopause currents
N80-13578
Technical support for open-cycle MHD program --- magnetohydrodynamic/boiler power systems analysis
[ANL/MHD-79-4] N80-13937
MAGNETOMETERS
A low energy electron magnetometer
[NASA-TM-80172] N80-13429
ISEE-1 and 2 magnetometer observations of the magnetopause
N80-13534
MAGNETOPAUSE
Global aspects of the Earth's magnetopause
N80-13530
Plasma structure of the magnetopause and boundary layer
N80-13532
ISEE-1 and 2 magnetometer observations of the magnetopause
N80-13534
Quasistatic electric fields observed during a number of magnetopause crossings by ISEE-1
N80-13535
Magnetopause electric and magnetic field signatures at times of magnetospheric compressions
N80-13536
Magnetic pulsations observed on board GEOS-2 in the ULF range during multiple magnetopause crossings
N80-13541
Energetic electron bursts in the magnetopause electron layer and in interplanetary space
N80-13544
Particle and field characteristics of the dayside magnetopause energetic electron layer
N80-13546
Particle boundary structures at the magnetopause and the plasma sheet
N80-13547
Variations of electron and ion distributions during dayside magnetopause crossings of GEOS-2
N80-13548
Low-altitude signatures of the boundary layers
N80-13550
STARE ionospheric electron flows during the August 28, 1978 GEOS-2 magnetopause crossing
N80-13552
Jupiter's magnetopause
N80-13558
Earth and Jupiter: Comparison of magnetopause structure
N80-13560
Solution of the Chapman-Ferraro problem within two dimensions
N80-13569
Influence of the interplanetary magnetic field on the position of the dayside magnetopause
N80-13570
Rates of mass, momentum, and energy transfer at the magnetopause
N80-13571
The formation and properties of boundary layers downstream from neutral lines in an open magnetosphere
N80-13572
Magnetopause Kelvin-Helmholtz instability
N80-13575
Towards a more quantitative understanding of dayside magnetopause currents
N80-13578
Electromagnetic structure of the magnetopause and boundary layer
N80-13581
MAGNETOSPHERE
Magnetospheric boundary layers --- conference proceedings, Albach, Austria, Jun. 1979
[ESA-SP-148] N80-13529
An electric-current model of the magnetosphere
N80-13531
External plasma flow --- as observed by heos-2
N80-13533
Radial discontinuities in low-energy magnetospheric plasma observed on GEOS-1
N80-13537
Critical level behavior of ion-cyclotron waves at magnetospheric boundary layers
N80-13542
Ion composition in the Dayside Cusp: Injection of ionospheric ions into the high latitude boundary layer
N80-13553
Birkeland currents and the interplanetary magnetic field
N80-13554
Comments on the low-altitude optical signatures of magnetospheric boundary layers
N80-13556
Low frequency waves and irregularities in the low altitude boundary layer
N80-13557
Jupiter's magnetopause
N80-13558
Solution of the Chapman-Ferraro problem within two dimensions
N80-13569
Influence of the interplanetary magnetic field on the position of the dayside magnetopause
N80-13570
Antiparallel merging, the half-wave rectifier response of the magnetosphere, and convection
N80-13573
Internal magnetospheric plasma flow
N80-13574
Interaction between the magnetospheric boundary layers and the ionosphere
N80-13579
Report on French research into the ionosphere-magnetosphere from 1975 to 1978
[CRPE-DT-1039] N80-13738
MAGNETOSPHERIC ELECTRON DENSITY
Observations of ion and electron distributions during the July 29 and July 30, 1977 storm period
N80-13540
MAGNETOSPHERIC INSTABILITY
Magnetopause electric and magnetic field signatures at times of magnetospheric compressions
N80-13536
MAGNETOSPHERIC ION DENSITY
First observations of the hot ion composition in the high altitude magnetospheric boundary layer by means of Prognoz-7
N80-13539
Observations of ion and electron distributions during the July 29 and July 30, 1977 storm period
N80-13540
MAGNETS
Spindown of rotating magnets --- astrophysical bodies
N80-13564
MALAYA
Studies on the thermosphere and ionosphere based on a detailed analysis of topside ionograms
[BMFT-FB-W-78-01] N80-13736
MAN MACHINE SYSTEMS
Application of modified profile analysis to function testing of the motion/no-motion issue in an aircraft ground-handling simulation --- statistical analysis procedure for man machine systems flight simulation
[NASA-TP-1540] N80-13024
On the interaction between system and task parameters through continuous manual control
[FB-42] N80-13780
MANAGEMENT ANALYSIS
Energy policy and decision analysis; new concepts and mechanisms
[LA-7909-MS] N80-13634
MANAGEMENT INFORMATION SYSTEMS
Use of virtual machines in the development of decision support systems
[AD-A073748] N80-13792
Utility language for the NMFECC
[CONF-781053-4] N80-13827
The work request system of a NASA Q1 package
[NASA-CR-162511] N80-13982
MANAGEMENT METHODS
Development of an electrical load demand and response model based on a rational synthesis from elementary devices
[DOE/ET-5109/1] N80-13371
MANAGEMENT PLANNING
Reliability and maintainability management manual --- quality control and reliability engineering in management planning for project management
[AD-A073299] N80-13491
Low-temperature thermal energy storage program annual operating plan
[ORNL/TM-6934] N80-13631
Derivation of a quantitative model to assess the performance of research and development organizations
N80-13981
MANAGEMENT SYSTEMS
Measurement, modeling and management of phased program behavior
N80-13813
MANGANESE
Difference frequency mixing in insulating GaAs and magnetooptical studies in Hg0.89Mno.11Te
N80-13952
deHass-vanAlphen measurements of spin resolved scattering in the Cu[Mn] magnetic impurity system
N80-13955
MANIFOLDS [MATHEMATICS]
Nonlinear hardy spaces and electrical power transfer
N80-13837
MANUAL CONTROL
A comparison of control simulators having force inputs and displacement feedback. Applications to the manual control of underwater vehicles
[FB-38] N80-13777
On the interaction between system and task parameters through continuous manual control
[FB-42] N80-13780
MANUALS
Reliability and maintainability management manual --- quality control and reliability engineering in management planning for project management
[AD-A073299] N80-13491
MANUFACTURING
Manufacturing cost data collection and analysis for composite production hardware
[AD-A073507] N80-13174
Curing and flow of thermosetting resins for composite material pultrusion
N80-13244
Silicon concentrator solar cell manufacturing development
[SAND-79-7021] N80-13697
MANY BODY PROBLEM
Dominant partition method --- based on a wave function formalism
[NASA-TM-80778] N80-13851
MAPPING
Earth observations division Earth resources data analysis capabilities
[E80-10013] N80-13592
Interactive aids for cartography and photo interpretation --- aerial photography
[AD-A073452] N80-13603
MARINE METEOROLOGY
The importance of eddy momentum flux in the dynamics of a hurricane: A numerical approach
N80-13741
MARINE RESOURCES
Wetland values concepts and methods wetlands evaluation
[AD-A069088] N80-13602
MARKETING
Commercialization task force for high Btu gasification
[TID-28849] N80-13286
Silicon concentrator solar cell manufacturing development
[SAND-79-7021] N80-13697
MARKOV PROCESSES
Stochastic modelling for reliability and other performance measures of software systems with applications
N80-13486
Infinite server queuing systems with renewal clearing and related models
N80-13832
MARTENSITIC TRANSFORMATION
X-ray measurement of carbon-caused atomic displacements in Fe-Ni-C martensite
N80-13217
Stress-assisted isothermal martensitic transformation and transformation plasticity
[AD-A073433] N80-13222
Computer simulation of martensitic transformations in idealized systems
[LBL-9264] N80-13228
MARYLAND
A technical and economic evaluation of the project in Baltimore, Maryland, volume 2 --- waste processing plant
[PB-297871/6] N80-13991
A technical and economic evaluation of the project in Baltimore, Maryland, Volume 3 --- waste processing plant
[PB-297872/4] N80-13992
A technical and economic evaluation of the project in Baltimore, Maryland, volume 4 --- waste processing plant
[PB-297873/2] N80-13993
MASKING
Auditory detection of bandpass-filtered impulses under various conditions of masking
N80-13877
MASS FLOW
Drag devices for two-phase mass flow measurements
[CONF-790655-5] N80-13409
MASS SPECTROMETERS
Spacelab environment investigation by mass spectrometer
[BMFT-FB-W-78-02] N80-13774
Mass spectrometer measurements of the Venus lower atmosphere composition
[D-271] N80-14005
MASS TRANSFER
An experimental method for determination of mass transport in liquid metals to be applied under microgravity
N80-13120
Theoretical and experimental studies of periodic currents and potentials in electroplating and in fast kinetics on a rotating disk electrode
N80-13350
Development of a mass transfer machine for gas/liquid operations in the absence of gravity
[BMFT-FB-W-78-20] N80-13420

Rates of mass, momentum, and energy transfer at the magnetopause
N80-13571

MATERIALS HANDLING
Preparation of a coal conversion systems technical data book, project 61003
[FE-2286-32] N80-13281

MATERIALS RECOVERY
Methane recovery from coalbeds project. Technology test projects: Evaluation of candidate projects
[METC-8089-T4] N80-13290
Phase behavior and interfacial tension studies of surfactant systems
N80-13395

MATERIALS SCIENCE
Material sciences in space --- conference proceedings, Grenoble, Apr. 1979
[ESA-SP-142] N80-13069

MATHEMATICAL MODELS
Inclusion of unsteady aerodynamics in longitudinal parameter estimation from flight data --- use of vortices and mathematical models for parameterization from flight characteristics
[NASA-TP-1536] N80-12995
Formulation of the equations of motion of a deformable aircraft using Lagrange's equations in an arbitrary non-inertial frame of reference
[RAE-TM-STRUCT-941] N80-13036
Synthesis of a control model for a liquid nitrogen cooled, closed circuit, cryogenic nitrogen wind tunnel and its validation
[NASA-CR-162508] N80-13058
Convective processes at low gravity
N80-13073
Reconsideration of macrosegregation during nonstationary solidification
N80-13106
Marangoni boundary layers
N80-13114
Analysis of combustion instability in liquid fuel rocket motors
[NASA-CR-159733] N80-13164
Computational of physical and chemical equilibria
N80-13184
Multiplicity and stability of nonadiabatic hydrogen-oxygen-nitrogen flames --- mathematical models
N80-13185
Several aspects of dynamic behavior in nonlinear mathematical models of chemical reaction and diffusion
N80-13186
Application of rapid solidification techniques to aluminum alloys --- mathematical model
[AD-A073443] N80-13223
Model studies of mixed-ion beta-aluminas
[CONF-790538-8] N80-13265
A survey of finite element-related techniques as applied to acoustic propagation in the ocean. Part 2: Transparent boundary simulation techniques
N80-13304
A filamentary multipole model for cylindrical antennas
N80-13320
Efficient numerical procedure for modeling antennas over lossy Earth
[UCRL-82121] N80-13341
Two-dimensional sequential algorithms for image restoration and enhancement
N80-13354
An explicit state model of a synchronous machine - transformer - SCR bridge unit
N80-13357
Development of an electrical load demand and response model based on a rational synthesis from elementary devices
[DOE/ET-5109/1] N80-13371
Determining load characteristics for transient performances. Volume 3: Procedure for modeling power system loads --- mathematical model to predict transient response to overvoltage
[EPRI-EL-849-VOL-3] N80-13381
Nonlinear simulation of type 1 irregularities in the equatorial electrojet
N80-13397
A large structure model of turbulence in two- dimensional jets
N80-13398
Mathematical modeling of the breakup of laminar capillary jets
N80-13399
Experimental and predicted performance for the combustion of a low heating value gas in a swirl burner --- finite difference analysis
N80-13467
Method for describing nearly normal penetration of an ogive nosed penetrator into terrestrial targets
[SAND-79-0721] N80-13479
Stochastic modelling for reliability and other performance measures of software systems with applications
N80-13486
Limit theorems for the reliability of series-parallel load-sharing systems
N80-13487
Extensions of a simple model with applications in reliability, extinction of species, inventory depletion and urn sampling
[AD-A073814] N80-13492
Modelling of crack tip deformation with finite element method and its aplications
N80-13503
Finite element linear models for symmetrically loaded thin shells of revolution
[LA-UR-79-1321] N80-13515
Thermoviscoplastic response of cylindrical structures using a state variable model
[COO-2733-19] N80-13516
Satellite contributions to tidal studies
[TUM-MITT-147] N80-13583
Mathematical modeling of phase change processes for latent heat thermal energy storage
[ORNL/CSD-39] N80-13639
OTEC system response and control analysis
[CONF-790631-2] N80-13657
Numerical simulation of sudden stratospheric warnings
[NASA-CR-162505] N80-13744
System parameters for erythropoiesis control model: Comparison of normal values in human and mouse model
[NASA-CR-160401] N80-13759
The application of formal models to a fully adaptive general purpose digital data compression system
N80-13785
Mathematical Modeling of Diverse Phenomena
[NASA-SP-437] N80-13839
Discussion of paper by Good and Gaskins on density estimation and bump hunting
[AD-A073269] N80-13867
The scattering of sound by a region of fluid in solid body rotation at low Mach number
[RAE-TR-78100] N80-13886
Design and analysis of transient high voltage electrical devices: Ozone production in fast pulsed dielectric barrier discharges in oxygen and modeling of an intense relativistic electron beam source
N80-13890
Transfer map approach to the beam-beam interaction --- mathematical model describing particle motion in particle beam interactions
[LA-UR-79-1752] N80-13913
A universal model for the surface energy of solids
[AD-A073671] N80-13969
Star formation
[UCRL-81758] N80-14001

MATHEMATICAL PROGRAMMING
Summary of technical progress, investigation of software models
[AD-A073639] N80-13819
Newton's method for generalized equations and the PIES energy model
N80-13872

MATRICES [MATHEMATICS]
Heuristic approaches to the decomposition of sparse matrices
N80-13810
Analysis of numerical stability and amplification matrices: Fourth-order Runge-Kutta methods
[NASA-TM-80836] N80-13841

MAXIMUM LIKELIHOOD ESTIMATES
Maximum likelihood estimation of the autoregressive coefficients and moving average covariances of vector autoregressive moving average models
[AD-A073788] N80-13845
Systems of frequency curves generated by transformations of logistic variables
[AD-A073481] N80-13847
Maximum likelihood estimation of the parameters of a multivariate normal distribution
[AD-A073796] N80-13865
A density-quantile function approach to choosing order statistics for the estimation of location and scale parameters
[AD-A073270] N80-13866
Recent applications of variational techniques in statistics
[AD-A073511] N80-13868

MAXWELL-BOLTZMANN DENSITY FUNCTION
Effect of deviations from the Maxwell distribution on neutron production in laser targets
[LA-7532-MS] N80-13460

MEAN
Extreme mean and its applications --- the p-th probability truncated normal distribution
[NASA-TM-81346] N80-13863

MEASURE AND INTEGRATION
The effect of analysis bandwidth on the accuracy of measurements and predictions of single degree of freedom system behavior
[AMTE[N]-TM-79401] N80-13526

MEASURING INSTRUMENTS
Drag devices for two-phase mass flow measurements
[CONF-790655-5] N80-13409
Instrumentation for environmental monitoring
[LBL-9323] N80-13722

MECHANICAL DRIVES
Mechanical power system for aircraft intermittent utility functions --- systems engineering of using flywheels for aircraft control equipment
[AD-A073297] N80-13030
Investigation of advanced prognostic analysis techniques --- failure analysis and wear tests of mechanical drive gears
[AD-A073553] N80-13032

MECHANICAL ENGINEERING
Coal liquefaction short residence time process research
[SAND-79-1400] N80-13272

MECHANICAL PROPERTIES
Hygrothermal damage mechanisms in graphite-epoxy composites
[NASA-CR-3189] N80-13170
Characterization of an oxide dispersion strengthened superalloy, MA-6000E, for turbine blade applications --- turbine blade
[NASA-CR-159493] N80-13218
Chemistry and heat treatment effects on mechanical and microstructural properties of heat-treated, beta-extruded Ti-6Al-6V-2Sn
[BDX-613-2170-REV] N80-13224
Evaluation of polar and non-polar plastics compounded with thermomechanical wood fibers
N80-13247
Microscopic mechanisms and mechanics of craze growth and fracture in polystyrene
N80-13507

MECHANICAL SHOCK
The shock and vibration digest, volume 11, number 4
[AD-A067426/7] N80-13302
The shock and vibration digest, volume 11, number 2
[AD-A065807] N80-13495

MEDIUM SCALE INTEGRATION
A functional simulation system for MSI and LSI systems
N80-13346

MELTING
Mathematical modeling of phase change processes for latent heat thermal energy storage
[ORNL/CSD-39] N80-13639
Melting behavior of small tin crystallites
N80-13950

MELTS [CRYSTAL GROWTH]
Some 3-5-semiconductor crystals grown by the traveling-heater method
N80-13117

MEMBRANES
Membrane oxygen enrichment cost and application evaluation
[ANL-78-108] N80-13205
A review of approximate methods for determining the vibrational modes of membranes
N80-13498

MERCURY [METAL]
Difference frequency mixing in insulating GaAs and magnetooptical studies in Hg0.89Mno.11Te
N80-13952

MERCURY COMPOUNDS
Experiment MORAVA on board Salyut 6 --- on the crystallization of eutectic compounds
N80-13096

MERCURY ION ENGINES
Hg ion thruster component testing
[NASA-TM-79287] N80-13159

METABOLISM
Dissolved organic matter and lake metabolism
[COO-1599-153-PT-1] N80-13604
Analysis of metabolic energy utilization in the Skylab astronauts
[NASA-CR-160402] N80-13770

METAL DRAWING
Strain hardening and ductility of iron: Axisymmetric vs. plane strain elongation
[COO-4072-2] N80-13234

METAL FATIGUE
Fatigue and delayed failure of refractory metals --- canadium and niobium hydride alloys
[COO-3459-14] N80-13233

METAL FIBERS
Design and testing of high performance brushes
[AD-A073593] N80-13367

METAL FILMS
Domain and surface structures of sodium tungsten bronzes, Na/sub x/WO3 [0.4 x 1]
[ANL-78-63] N80-13237

METAL FOILS
The elastic modulus and diffusion coefficents of silver-palladium composition modulated foils
N80-13216

METAL HYDRIDES
Delayed failure of vanadium-hydrogen alloys
[COO-3459-15] N80-13227
Fatigue and delayed failure of refractory metals --- canadium and niobium hydride alloys
[COO-3459-14] N80-13233

METAL MATRIX COMPOSITES
Fabrication of composite materials under low gravity [experiment ES 310 of the First Spacelab Payload [FSLP]]
N80-13084
Stability of multicomponent mixtures under microgravity conditions
N80-13099
Identification of the elastic constants for composites using modal analysis
[SAND-79-0527C] N80-13176

METAL OXIDE SEMICONDUCTORS
Process oriented design aids for very large scale integrated circuits
N80-13348

Study of the physics of insulating films as related to the reliability of metal-oxide semiconductor devices
[AD-A073300] N80-13364

METAL OXIDES
Characterization of an oxide dispersion strengthened superalloy, MA-6000E, for turbine blade applications --- turbine blade
[NASA-CR-159493] N80-13218

METAL PLATES
Improved boundary-integral equation method for time-dependent inelastic deformation in metals
[COO-2733-20] N80-13230

METAL SURFACES
UHV-chamber: Theoretical background and facility development --- for dynamic contact experiments
N80-13086

Damage of metal surfaces by a hot, dense deuterium plasma
N80-13212

Metal silver-liquid interface: Oxide properties from reflectance and scattered light spectroscopy
[COO-4381-7] N80-13235

Scanning reference electrode techniques in localized corrosion
[BNL-26094] N80-13238

METALLIC GLASSES
Reactions between glass melts
N80-13101

METALS
Elongation upon torsion in a theory for the inelastic behavior of metals
[COO-2733-1] N80-13231

METEOROLOGICAL PARAMETERS
Critique of the meteorological and air quality baseline monitoring program for the prototype oil shale leaseholds. Part A: Comments on the approach taken and recommendations for continuing program. Part B: Comments on the data acquisition and management
[DOE/EV-70031/4-PT-A/B] N80-13723

National wind data index
[HCP/T1041-01] N80-13745

Meteorological and oceanographic observations on board Dutch light vessels and the light platform 'Goeree' in the North Sea
[KNMI-141-26] N80-13749

Meteorological observations in the Netherlands for 1977
[KNMI-97-129] N80-13750

METHANE
High-pressure LOX/CH4 injector program
[NASA-CR-161342] N80-13161

Design, fabrication and delivery of a high pressure LOX-methane injector
[NASA-CR-161343] N80-13162

Biological transformation of light energy into methane using an anaerobic filter
N80-13267

Methane recovery from coalbeds project. Technology test projects: Evaluation of candidate projects
[METC-8089-T4] N80-13290

Shock compression of liquid methane and the principle of corresponding states
[UCRL-82127] N80-13410

METHYL ALCOHOLS
Driving cycle comparisons of energy economies and emissions from an alcohol and gasoline fueled vehicle
[CONF-790520-7] N80-13274

The 50,000 mile methanol/gasoline blend fleet study --- fuel efficiency and exhaust emissions
[CONF-790520-6] N80-13275

Evaluation of methanol for reduced exhaust emissions in a single-cylinder research engine
[CONF-790520-3] N80-13276

METROLOGY
Standard reference data program authorization
[GPO-25-887] N80-13315

MICROANALYSIS
The influence of space conditions on directional crystallization of germanium and its properties
N80-13072

Optimization of an analytical electron microscope for X-ray microanalysis: Instrumental problems
[CONF-790418-6] N80-13432

MICROCRACKS
Initiation and growth of fatigue microcracks and strain-controlled fatigue properties in steel alloys: Microstructure and mechanics
N80-13508

MICROELECTRONICS
Reliability test and evaluation of MIL-M-38510 linear microcircuits
[AD-A073455] N80-13363

Development of two monolithic integrated circuits and a 10-kHz Tape Automated Bonded [TAB] hybrid microcircuit oscillator
[AD-A073565] N80-13368

Latch-up and radiation integrated circuit--EURIC: A test chip for CMOS latch-up investigation
[SAND-78-1540] N80-13369

Computer aided design of microcircuits. Citations from the NTIS data base
[NTIS/PS-79/0870/0] N80-13388

Computer aided design of microcircuits. Citations from the Engineering Index data base
[NTIS/PS-79/0871/8] N80-13389

Heterodyne detection and generation of microwave radiation by superconducting microbridges in a resonant structure
N80-13954

MICROPROCESSORS
The use of a microprocessor for the manipulation and representation of large amounts of data on a color television monitor
[FB-39] N80-13795

Real-time emulation of hardware
N80-13802

MICROPROGRAMMING
Reliable microprogramming
[AD-A073454] N80-13826

MICROSTRIP TRANSMISSION LINES
Design and fabrication on microstrip disk antenna arrays
N80-13328

MICROSTRUCTURE
Skin technology --- and the improvement of materials microstructures
N80-13083

Section size effects on toughness of various cast steels
N80-13210

Damage of metal surfaces by a hot, dense deuterium plasma
N80-13212

Chemistry and heat treatment effects on mechanical and microstructural properties of heat-treated, beta-extruded Ti-6Al-6V-2Sn
[BDX-613-2170-REV] N80-13224

Computer simulation of martensitic transformations in idealized systems
[LBL-9264] N80-13228

Combined macroscopic and microscopic approach to the fracture of metals
[COO-3084-69] N80-13229

Structures, spectra and related properties of titanium-, zirconium-, and hafnium-doped vitreous silica
N80-13245

Effects of metallurgical microstructure of armatures on compressed magnetic field generators
[SAND-79-0890C] N80-13375

Microscopic mechanisms and mechanics of craze growth and fracture in polystyrene
N80-13507

A microscopic description of interpenetrated plasma regions
N80-13568

Initial epitaxy and interdiffusion phenomena in Au-Cu bilayers --- microstructure
N80-13948

Microstructure, sintering and strength of polycrystalline SiC
[LBL-9257] N80-13976

MICROWAVE ANTENNAS
A intrusive slotted cylinder antenna array for subsurface moisture profiling
N80-13323

MICROWAVE LANDING SYSTEMS
Experimental determination of position-estimate accuracy using back-azimuth signals from a microwave landing system
[NASA-TP-1574] N80-13020

MICROWAVES
Surface motion and confinement potential for a microwave confined corona
[UCID-18227] N80-13943

Heterodyne detection and generation of microwave radiation by superconducting microbridges in a resonant structure
N80-13954

Planar Josephson junction radiation detector
N80-13958

MILITARY TECHNOLOGY
Nuclear pumped lasers: Advantages of O2 [1 delta]
N80-13451

MILLING [MACHINING]
Industrial capability to chem-mill aluminum alloy 2219 in T-37 and T-87
[NASA-CR-161349] N80-13316

MINERAL DEPOSITS
Remote sensing applied to geology and mineralogy. A bibliography with abstracts
[NTIS/PS-79/0844/5] N80-13612

MINES [EXCAVATIONS]
Underground coal conversion. Program description
[DOE/ET-0100] N80-13293

Review of supporting research at Oak Ridge National Laboratory for underground coal conversion
[CONF-790630-9] N80-13295

MINICOMPUTERS
Digital filtering techniques for use in minicomputers
[Y-2184] N80-13380

MINIMAX TECHNIQUE
Gamma-minimax and minimax decision rules for comparison of treatments with a control
[AD-A073576] N80-13834

Some contributions to gamma-minimax and empirical Bayes selection procedures
[AD-A073574] N80-13869

MINING
Development of mining guidance and control systems
[NASA-TM-78226] N80-13601

MINNESOTA
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589

Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590

Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594

Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595

MINORITY CARRIERS
Lifetime control in silicon through focused laser beam damage
[AD-A072909] N80-13455

MIRRORS
Co-sputtering of aluminum-silver alloy mirrors for solar reflectors
[RFP-2896] N80-13626

Figure control for a segmented telescope mirror
[LBL-8621] N80-13997

MISSILE BODIES
Investigation of flow characteristics over missile bodies at supersonic speeds
[NASA-TP-1579] N80-13001

MISSILE CONFIGURATIONS
Supersonic stability and control characteristics of a cruciform missile model with delta wings and aft tail fin control --- Langley unitary plan wind tunnel tests
[NASA-TM-80171] N80-13000

MISSILE CONTROL
Supersonic stability and control characteristics of a cruciform missile model with delta wings and aft tail fin control --- Langley unitary plan wind tunnel tests
[NASA-TM-80171] N80-13000

MISSION PLANNING
Office of Aeronautics and Space Technology preliminary requirements for space science and applications platform studies
[NASA-CR-161346] N80-13066

Problems posed by the integration of materials science experiments with spacecraft systems
N80-13124

System definition study for a German contribution to the Jupiter Orbiter Probe project
[BMFT-FB-W-78-24] N80-13128

OPS MCC level B/C formulation requirements: Area targets and space volumes processor
[NASA-TM-80839] N80-13840

MIXERS
Positioning and mixing instrumentation employing electrostatic and acoustic principles
N80-13088

MODELS
Nuclear pumped laser modeling
N80-13448

MODULATION
The elastic modulus and diffusion coefficents of silver-palladium composition modulated foils
N80-13216

MODULUS OF ELASTICITY
The elastic modulus and diffusion coefficents of silver-palladium composition modulated foils
N80-13216

MOISTURE CONTENT
Comparison of centrifuge and freezing calorimeter methods for measuring free water in snow
[NASA-CR-162504] N80-13319

MOLDS
Energy saving in injection molding
[NEL-662] N80-13318

MOLECULAR DIFFUSION
Several aspects of dynamic behavior in nonlinear mathematical models of chemical reaction and diffusion
N80-13186

MOLECULAR ENERGY LEVELS
Molecular application to the equations of motions method
N80-13891

MOLECULAR EXCITATION
Molecular application to the equations of motions method
N80-13891

Multiple-photon excitation of polyatomic molecules in a strong optical field: A universal normalization
[LA-UR-79-1524] N80-13896

MOLECULAR FLOW
Molecular two dimensional flow of mixtures of light and heavy gases with diffuse and specular reflection
[ESA-TT-508-REV] N80-13011

MOLECULAR INTERACTIONS
Studies in molecular dynamics of the friction coefficient and the Lorentz gas
[UCRL-52815] N80-13895

MOLECULAR IONS
Studies of ionization processes --- laser applications for study of chemical energy and reaction kinetics in molecular ions
[AD-A073823] N80-13195
MOLECULAR ORBITALS
An orbital localization method and an iterative procedure for calculating nuclear magnetic resonance coupling constants
N80-13189
K-L and L-K vacancy sharing in ion-atom collisions
[UCRL-81947] N80-13894
MOLECULAR STRUCTURE
Heterojunction materials and characteristics --- molecular structure study of gallium arsenides aluminum compounds heterojunction devices
[AD-A073792] N80-13365
K-L and L-K vacancy sharing in ion-atom collisions
[UCRL-81947] N80-13894
MOLECULAR THEORY
Studies in molecular dynamics of the friction coefficient and the Lorentz gas
[UCRL-52815] N80-13895
MOMENT DISTRIBUTION
Estimation of the spectral moments and quadrature cross-correlation functions and their application to troposcatter systems
N80-13322
MOMENTS OF INERTIA
On the optimization of spring elasticity, damping, and inertia effects on the spring loading of a control stick
[FB-37] N80-13776
MOMENTUM TRANSFER
Rates of mass, momentum, and energy transfer at the magnetopause
N80-13571
Elastic electron scattering at large momentum transfer
[SLAC-PUB-2334] N80-13903
MONITORS
Statistical techniques for automating the detection of anomalous performance in rotating machinery
[CONF-790433-2] N80-13481
MONSOONS
Report of the fifth planning meeting for the Monsoon Experiment [MONEX]. Part 1: Winter MONEX
[GARP-SPEC-REPT-30] N80-13748
MONTANA
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
MONTE CARLO METHOD
Sequential analysis of variance: Monte Carlo simulation, multivariate normal approximation, and robustness
[AD-A072629] N80-13818
Determination of the intensity of scattered radiation and the performance of grids in diagnostic radiology by Monte Carlo methods
N80-13921
NFREYA: A Monte Carlo beam deposition code for noncircular Tokamak plasmas
[ORNL/TM-6845] N80-13944
MORPHOLOGY
A correlation between morphology and fracture properties of epoxy resins
N80-13248
MOSSBAUER EFFECT
Loss of lattice rigidity in austenite
[AD-A073280] N80-13221
MOTION SICKNESS
Reliability, validity and application of an improved scale for assessment of motion sickness severity
[AD-A069130] N80-13766
MOTION SIMULATORS
Application of modified profile analysis to function testing of the motion/no-motion issue in an aircraft ground-handling simulation --- statistical analysis procedure for man machine systems flight simulation
[NASA-TP-1540] N80-13024
A comparison of control simulators having force inputs and displacement feedback. Applications to the manual control of underwater vehicles
[FB-38] N80-13777
The automobile driving simulator for anthropogenic research
[FB-41] N80-13779
MULTICHANNEL COMMUNICATION
Adaptive algorithms for reduction of interchannel and intersymbol interference in digital communications
N80-13807
MULTIPATH TRANSMISSION
Dynamic behavior of shortest path routing algorithms for communication networks
[AD-A073487] N80-13338
Experimental methods for the characterization of multiconductor cable systems
[AD-A073767] N80-13366
MULTIPLE ACCESS
PDP-11 computer monitoring system
[AD-A072966] N80-13790
The transfer of information and authority in a protection system
[AD-A073370] N80-13791
MULTIPLE BEAM INTERVAL SCANNERS
Overlapped sub-array scanning antenna study
[AD-A070939] N80-13339
MULTIPOLES
A filamentary multipole model for cylindrical antennas
N80-13320
MULTIPROCESSING [COMPUTERS]
The analysis of processor-time trade-off opportunities in a reconfigurable multi-processor system
N80-13783
Interconnection networks in multiple-processor systems --- communication networks
N80-13784
A compiler design for multiple independent processor computers
N80-13786
The design and evaluation of algorithms for parallel processing
N80-13805
MULTIVARIATE STATISTICAL ANALYSIS
Sequential analysis of variance: Monte Carlo simulation, multivariate normal approximation, and robustness
[AD-A072629] N80-13818
Extreme sample censoring problems with multivariate data, 2
[AD-A073563] N80-13848
Detection of multivariate outliers --- in normal data
N80-13861
Bayesian parameter and reliability estimation for a multivariate exponential distribution
N80-13862
Maximum likelihood estimation of the parameters of a multivariate normal distribution
[AD-A073796] N80-13865
MUSCULAR STRENGTH
Development and description of a device for static strength measurement in the armed forces examination and entrance station
[AD-A068684] N80-13765

N

NACELLES
Force and moment data from a wind-tunnel test of a tilt-nacelle V/STOL propulsion system with an attitude control vane --- conducted in Ames 40 by 80 foot wind tunnel
[NASA-TM-81157] N80-13003
NASA PROGRAMS
Application of a tracking and Data Relay Satellite System [TDRSS] to European requirements
[BMFT-FB-W-78-37] N80-13131
The work request system of a NASA Q1 package
[NASA-CR-162511] N80-13982
NATIONS
World energy data system [WENDS]. Volume 8: Nuclear facility profiles, CO-HU
[ANL-PMS-79-2-VOL-8] N80-13630
NATURAL GAS
Devonian paleocurrents of the Applachian basin --- gas production
[METC/CR-79/22] N80-13735
NAVIER-STOKES EQUATION
Three-dimensional viscous hypersonic flows over general bodies using shock-layer and parabolized Navier-Stokes equations
N80-12993
NAVIGATION AIDS
In-service improvements and modernization of all components of the instrument landing systems. Volume 1: Sections 1-10
[AD-A074425] N80-13018
In-service improvements and modernization of all components of the instrument landing systems. Volume 2: Sections 11 and 12
[AD-A074426] N80-13019
Experimental determination of position-estimate accuracy using back-azimuth signals from a microwave landing system
[NASA-TP-1574] N80-13020
NAVIGATION INSTRUMENTS
Flight test of navigation and guidance sensor errors measured on STOL approaches
[NASA-TM-81154] N80-13041
NEAR WAKES
Unsteady flow characteristics in the near wake of a two dimensional obstacle
[AAAF-NT-79-08] N80-13008
NEBRASKA
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedur for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
Test plan for the Mead 25-kW Photovoltaic Flexible Test Facility, 1979
[COO-4094-53] N80-13692
NEON
Measurement of the inelastic x-ray scattering cross section of neon with synchroton radiation
N80-13889
NETHERLANDS
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
Meteorological and oceanographic observations on board Dutch light vessels and the light platform 'Goeree' in the North Sea
[KNMI-141-26] N80-13749
Meteorological observations in the Netherlands for 1977
[KNMI-97-129] N80-13750
NETWORK ANALYSIS
Dynamic behavior of shortest path routing algorithms for communication networks
[AD-A073487] N80-13338
The complexity of the maximum subgraph problem
N80-13809
Algorithms for network flow problems with convex separable costs
N80-13871
NETWORK SYNTHESIS
Harmonic current propagation on AC systems due to HUDC links
N80-13326
NEUTRAL BEAMS
Multimegawatt neutral beams for Tokamaks
[LBL-8891] N80-13938
Scaling studies of beam-heated tokamaks
[ORNL/TM-6584] N80-13939
NFREYA: A Monte Carlo beam deposition code for noncircular Tokamak plasmas
[ORNL/TM-6845] N80-13944
NEUTRAL PARTICLES
A fluid mechanical-kinetic theory description of a spherically symmetric discharge in a neutral medium
N80-13464
NEUTRON IRRADIATION
Property changes in graphite irradiated at changing irradiation temperature
[GA-A-15270] N80-13178
Effect of phase instabilities on the correlation of nickel ion and neutron irradiation swelling in solution annealed 316 stainless steel
[CONF-790657-2] N80-13226
University of Illinois nuclear pumped laser program --- experiments with a TRIGA pulsed reactor with a broad pulse and a low peak flux
N80-13444
NEUTRON RADIOGRAPHY
Performance of a pressurized multiwire proportional chamber for neutron radiography
[LBL-9316] N80-13897
NEUTRON SCATTERING
Neutron spectroscopy of fast hydrogen diffusion in BCC transition metals
[BNL-26075] N80-13225
NEUTRON STARS
Instabilities of accretion disk: Magnetosphere interfaces
N80-13562
Interaction of accretion disk and rotating magnetic field of neutron star
N80-13563
NEVADA
Energy system in the Far West: Impacts of the National Energy Act of 1978
[UCRL-52754] N80-13638
Average structure of the upper Earth mantle and crust between Albuquerque and the Nevada test site
[SAND-79-0975] N80-13732
Technical concept for test of geologic storage of spent reactor fuel in the Climax granite, Nevada Test Site
[UCID-18197] N80-13918
NEW MEXICO
Hot dry rock geothermal energy development program
[LA-7807-HDR] N80-13673
Average structure of the upper Earth mantle and crust between Albuquerque and the Nevada test site
[SAND-79-0975] N80-13732
Evaluation of the proposed WIPP site in Southeast New Mexico --- waste isolation pilot plant
[SAND-79-1113C] N80-13909

NEWTON-RAPHSON METHOD
Newton's method for generalized equations and the PIES energy model
N80-13872
NICKEL
Effect of phase instabilities on the correlation of nickel ion and neutron irradiation swelling in solution annealed 316 stainless steel
[CONF-790657-2] N80-13226
Experiment and prediction in the bending of a nickel beam at 200 deg C
[COO-2733-21] N80-13519
Determination of the vacancy formation enthalpy for high purity Ni
[BNL-26191] N80-13971
NICKEL ALLOYS
The rate of dissociation of CO2 on liquid iron and nickel
N80-13215
X-ray measurement of carbon-caused atomic displacements in Fe-Ni-C martensite
N80-13217
Characterization of an oxide dispersion strengthened superalloy, MA-6000E, for turbine blade applications --- turbine blade
[NASA-CR-159493] N80-13218
Transport properties of the compositionally modulated alloy Cu/Ni
[CONF-790341-8] N80-13970
NICKEL COATINGS
Infrared absorption of spectroscopy of carbon monoxide on nickel films: A low temperature thermal detection technique
[LBL-8482] N80-13239
Formation and coalescence of epitaxial crystallites in nickel electrodepositon in air and argon atmospheres
N80-13947
NICKEL STEELS
Comparison tests and experimental compliance calibration of the proposed standard round compact plane strain fracture toughness specimen
[NASA-TM-81379] N80-13513
NIGHT VISION
Aviation night vision goggle
[AD-A073296] N80-13773
NIOBIUM
Effect of electron irradiation on the strength of niobium single crystals
N80-13961
NIOBIUM ALLOYS
Analytical electron microscope study of the omega phase transformation in a zirconium-nobium alloy
[ORNL/TM-6705] N80-13240
Initiation and growth of fatigue microcracks and strain-controlled fatigue properties in steel alloys: Microstructure and mechanics
N80-13508
NIOBIUM COMPOUNDS
Resistivity and hall coefficient measurements of iron doped niobium diselenide crystals
N80-13951
NIOBIUM OXIDES
A new thermal conductivity apparatus for small conducting specimens and measurememts on niobium monoxide --- measuring thermal conductivity, electrical resistivity, and thermoelectric power
N80-13428
NIOBIUM STANNIDES
Superconducting properties of [Nb,Ta]3Sn wires fabricated by the bronze process
[BNL-26391] N80-13383
NITROGEN
Multiplicity and stability of nonadiabatic hydrogen-oxygen-nitrogen flames --- mathematical models
N80-13185
NITROGEN LASERS
Laser-induced emission from uranium-hexa-fluoride
N80-13893
NITROGEN OXIDES
Atomizing characteristics of swirl can combustor modules with swirl blast fuel injectors --- in terms of NOX emission rate
[NASA-TM-79297] N80-13047
Effect of pressure on structure and NO sub X formation in CO-air diffusion flames
[NASA-TP-1448] N80-13191
Photochemistry of dinitrogen pentoxide
[LBL-9034] N80-13206
An analytical study of nitrogen oxides and carbon monoxide emissions in hydrocarbon combustion with added nitrogen, preliminary results
[NASA-TM-79296] N80-13721
NOISE INTENSITY
Effects of sound level fluctuations on annoyance caused by aircraft-flyover noise
[NASA-TP-1576] N80-13880
NOISE MEASUREMENT
Estimation of the RMS value of summed sinusoids and the application to acoustic noise measurement in shallow water
[AMTE[N]-TM-78413] N80-13885
NOISE REDUCTION
Feasibility study of an active system for transformer noise abatement
[COO-4376-T1] N80-13378
Advanced turbo-prop airplane interior noise reduction-source definition
[NASA-CR-159668] N80-13882
NOISE TOLERANCE
Effect of noise spectra and a listening task upon passenger annoyance in a helicopter interior noise environment
[NASA-TP-1590] N80-13769
NONADIABATIC CONDITIONS
Multiplicity and stability of nonadiabatic hydrogen-oxygen-nitrogen flames --- mathematical models
N80-13185
NONAQUEOUS ELECTROLYTES
Design and development of a 30 watt solid polymer electrolyte fuel cell power source fueled with calcium hydride
[AD-A071157] N80-13625
NONDESTRUCTIVE TESTS
Surface-crack characterization by use of dynamic photoelastic spectroscopy
[IS-M-211] N80-13514
Determining biological fine structure by differential absorption of soft X-ray
[BNL-26282] N80-13760
NONEQUILIBRIUM CONDITIONS
Experimental investigation of the local density and temperature distribution in the flow field around a sphere with high thermodynamic nonequilibrium using the electron beam technique
[ESA-TT-516-REV] N80-13012
Experimental investigations of nonequilibrium flashing of water in a converging-diverging nozzle
[BNL-NUREG-25716] N80-13417
NONLINEAR EQUATIONS
Nonlinear simulation of type 1 irregularities in the equatorial electrojet
N80-13397
Computational experiments on two error estimation procedures for ordinary differential equations
[AD-A073768] N80-13844
NONLINEAR FEEDBACK
On the problem of spring loaded resistance to simple and complex positioning of a control stick --- in manual control experiments
[FB-40] N80-13778
NONLINEAR FILTERS
Software for nonlinear filtering
[AD-A073051] N80-13817
NONLINEAR OPTICS
Nonlinear optics: Parametric amplification at 16 micrometers and oscillator mode competition
[LA-7850-T] N80-13927
NONLINEAR PROGRAMMING
Superlinearly globally convergent algorithms for nonlinear programming via sequential linear programs
N80-13808
NONLINEAR SYSTEMS
INCAP: A finite element program for one-dimensional nonlinear inverse heat conduction analysis
[ORNL/NUREG/CSD/TM-8] N80-13407
NONLINEARITY
Recent developments for the nonlinear distortion of non-dispersive acoustic waves. Part 1: Planar waves and the basic method
N80-13311
Detection and MMSE estimation of nonlinear memoryless functionals of random processes using the Volterra functional expansion
N80-13355
Newton's method for generalized equations and the PIES energy model
N80-13872
NONUNIFORM PLASMAS
Electromagnetic lower hybrid instabilities in an inhomogeneous plasma
N80-13934
NORMAL DENSITY FUNCTIONS
Detection of multivariate outliers --- in normal data
N80-13861
Extreme mean and its applications --- the p-th probability truncated normal distribution
[NASA-TM-81346] N80-13863
Maximum likelihood estimation of the parameters of a multivariate normal distribution
[AD-A073796] N80-13865
NORTH AMERICA
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
NORTH DAKOTA
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
NORTH SEA
Meteorological and oceanographic observations on board Dutch light vessels and the light platform 'Goeree' in the North Sea
[KNMI-141-26] N80-13749
NOSE TIPS
A numerical solution for temperature distributions in a discrete injection transpiration-cooled nosetip system
[AD-A073340] N80-13406
NUCLEAR ENERGY
World Energy Data System [WENDS]. Volume 7: Nuclear facility profiles, AG-CH
[ANL-PMS-79-2-VOL-7] N80-13629
World energy data system [WENDS]. Volume 8: Nuclear facility profiles, CO-HU
[ANL-PMS-79-2-VOL-8] N80-13630
NUCLEAR FISSION
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7952-PR] N80-13911
NUCLEAR FUELS
World Energy Data System [WENDS]. Volume 7: Nuclear facility profiles, AG-CH
[ANL-PMS-79-2-VOL-7] N80-13629
World energy data system [WENDS]. Volume 8: Nuclear facility profiles, CO-HU
[ANL-PMS-79-2-VOL-8] N80-13630
NUCLEAR FUSION
Technical review of the Sandia Laboratories' Particle Beam Fusion Program
[SAND-79-7044] N80-13940
Fusion power program
[ANL/FPP-78-4] N80-13941
NUCLEAR MAGNETIC RESONANCE
Magnetic resonance studies of epoxy resins and polyurethanes
[AD-A073590] N80-13173
An orbital localization method and an iterative procedure for calculating nuclear magnetic resonance coupling constants
N80-13189
NUCLEAR PARTICLES
The nuclear and ionic charge distribution particle experiments on the ISEE-1 and ISEE-C spacecraft
[BMFT-FB-W-78-38] N80-13132
NUCLEAR POWER PLANTS
Automated welding of nuclear piping systems --- gas tungsten arc welding in nuclear power plants
[CONF-790841-1] N80-13478
Land-based application of an OTEC open-cycle power system
[CONF-790631-3] N80-13676
NUCLEAR PUMPED LASERS
Nuclear-Pumped Lasers --- efficient conversion of energy liberated in nuclear reactions to coherent radiation
[NASA-CP-2107] N80-13438
University of Florida nuclear pumped laser program --- excitation of laser gaseous
N80-13439
Nuclear-pumped CO2 laser
N80-13440
Experimental setup for decomposition of UF6
N80-13441
CW nuclear pumped lasing of 3He-Ne
N80-13442
Spectral emission of nuclear excited XeBr*
N80-13443
University of Illinois nuclear pumped laser program --- experiments with a TRIGA pulsed reactor with a broad pulse and a low peak flux
N80-13444
Nuclear pumping mechanisms in atomic carbon and in excimers
N80-13445
LaRC results on nuclear pumped noble gas lasers
N80-13446
Nuclear excitation of CO2 and CO
N80-13447
Nuclear pumped laser modeling
N80-13448

Kinetics of a CO2 nuclear pumped laser
N80-13449
Nuclear pumped laser research at the Jet Propulsion Laboratory
N80-13450
Nuclear pumped lasers: Advantages of O2 [1 delta]
N80-13451
Simulation studies for a nuclear photon pumped excimer laser
N80-13452
Concept for UF6-fueled self-critical DNPL reactor system
N80-13453
Compilation of data relevant to nuclear pumped lasers, volume 5
[AD-A073575] N80-13457

NUCLEAR PUMPING
LaRC results on nuclear pumped noble gas lasers
N80-13446
Nuclear pumped laser modeling
N80-13448
Kinetics of a CO2 nuclear pumped laser
N80-13449
Nuclear pumped laser research at the Jet Propulsion Laboratory
N80-13450
Nuclear pumped lasers: Advantages of O2 [1 delta]
N80-13451
Concept for UF6-fueled self-critical DNPL reactor system
N80-13453

NUCLEAR REACTIONS
Nuclear-Pumped Lasers --- efficient conversion of energy liberated in nuclear reactions to coherent radiation
[NASA-CP-2107] N80-13438
Effect of deviations from the Maxwell distribution on neutron production in laser targets
[LA-7532-MS] N80-13460

NUCLEAR REACTORS
Application of static and dynamic crack arrest theory to thermal shock experiment TSE-4 --- fracture behavior of reactor pressure vessels
[NUREG-CR-0767] N80-13524
World Energy Data System [WENDS]. Volume 7: Nuclear facility profiles, AG-CH
[ANL-PMS-79-2-VOL-7] N80-13629
Baseline design of the thermoelectric reactor space power system
[LA-UR-79-1242] N80-13906

NUCLEAR RESEARCH
World energy data system [WENDS]. Volume 8: Nuclear facility profiles, CO-HU
[ANL-PMS-79-2-VOL-8] N80-13630

NUCLEATION
Characterization and properties of controlled nucleation thermochemical deposited [CNTD] silicon carbide
[NASA-TM-79277] N80-13254

NUMERICAL ANALYSIS
Efficient numerical procedure for modeling antennas over lossy Earth
[UCRL-82121] N80-13341
Heat conduction from a sphere to an infinite external region
[SAND-79-0366] N80-13419
Dynamic analysis of flexible mechanisms
N80-13502

NUMERICAL INTEGRATION
Delta-Rho, a second order trajectory perturbation technique
N80-13133
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-79/0851/0] N80-13425
Numerical methods in fluid flow problems, volume 5. A bibliography with abstracts
[NTIS/PS-79/0852/8] N80-13426

NUMERICAL STABILITY
Analysis of numerical stability and amplification matrices: Fourth-order Runge-Kutta methods
[NASA-TM-80836] N80-13841

NUTRIENTS
Dissolved organic matter and lake metabolism
[COO-1599-153-PT-1] N80-13604

O

OATS
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593

OBLIQUE WINGS
Some recent trends in aircraft flutter research --- analysis of flutter for aircraft design and use of oblique wings in aircraft configurations
N80-13307

OCEAN BOTTOM
Development of in situ marine seismic and geotechnical instrumentation systems
[SAND-79-0868C] N80-13431
Long water wave propagation under the influence of the depth variation. Part 1: Long water waves incident upon a transition zone of an exponential depth variation. Part 2: Long water waves incident upon a seamount model of a linearly cylindrical depth variation
N80-13584
Crustal structure in areas of active crustal accretion
N80-13727

OCEAN CURRENTS
The ocean tide and waves beneath the Ross Ice Shelf, Antarctica
N80-13751
Isopycnal transport by the Antarctic circumpolar current and the Antarctic influence at intermediate water densities
N80-13752
A compilation of moored current meter and wind recorder data. Volume 18: JASIN 1978, Moorings 651-653
[AD-A073581] N80-13755
Tropical disturbances in an oceanic general circulation model with seasonal forcing
[AD-A073602] N80-13756

OCEAN DATA ACQUISITIONS SYSTEMS
Development of in situ marine seismic and geotechnical instrumentation systems
[SAND-79-0868C] N80-13431
A compilation of moored current meter and wind recorder data. Volume 18: JASIN 1978, Moorings 651-653
[AD-A073581] N80-13755

OCEAN MODELS
Tropical disturbances in an oceanic general circulation model with seasonal forcing
[AD-A073602] N80-13756

OCEAN THERMAL ENERGY CONVERSION
Condensation and evaporation heat transfer with low-boiling temperature fluids --- for ocean thermal and geothermal energy conversion
[CONF-790539-1] N80-13412
OTEC platform configuration and integration. Volume 1: Systems engineering and integration
[TID-29418] N80-13655
OTEC thermal response report for Pacific plant ship, 5 to 10 deg N 90 to 95 deg W
[HCP/T2898-01/3] N80-13656
OTEC system response and control analysis
[CONF-790631-2] N80-13657
Experimental and analytical OTEC studies at ORNL
[CONF-790631-1] N80-13666
Land-based application of an OTEC open-cycle power system
[CONF-790631-3] N80-13676
OTEC power systems
[CONF-790444-2] N80-13696
OTEC platform configuration and integration, executive summary
[DOE/ET-4065/1] N80-13711
OTEC platform configuration and integration. Volume 2: Technical concept
[DOE/ET-4065/1-VOL-2] N80-13712
OTEC platform configuration and integration, appendixes to volume 2
[DOE/ET-4065/1-VOL-2-APP] N80-13713
OTEC platform configuration and integation. Volume 3: Project plan
[DOE/ET-4065/1-VOL-3] N80-13714

OCEANOGRAPHIC PARAMETERS
Meteorological and oceanographic observations on board Dutch light vessels and the light platform 'Goeree' in the North Sea
[KNMI-141-26] N80-13749

OCEANOGRAPHY
The fate of dissolved aluminum within the oceans
N80-13586

OCEANS
A survey of finite element-related techniques as applied to acoustic propagation in the ocean. Part 1: Finite element method and related techniques
N80-13300
A survey of finite element-related techniques as applied to acoustic propagation in the ocean. Part 2: Transparent boundary simulation techniques
N80-13304

OCTANE NUMBER
Physical properties of gasoline/alcohol automotive fuels
[CONF-790520-4] N80-13273

OFFSHORE PLATFORMS
OTEC platform configuration and integration. Volume 1: Systems engineering and integration
[TID-29418] N80-13655
OTEC platform configuration and integration, appendixes to volume 2
[DOE/ET-4065/1-VOL-2-APP] N80-13713
OTEC platform configuration and integation. Volume 3: Project plan
[DOE/ET-4065/1-VOL-3] N80-13714

OGIVES
Method for describing nearly normal penetration of an ogive nosed penetrator into terrestrial targets
[SAND-79-0721] N80-13479

OHMIC DISSIPATION
The effects of Joule heat on turbulent dispersion of temperature in high Reynolds number flow
N80-13396

OIL EXPLORATION
Critique of the meteorological and air quality baseline monitoring program for the prototype oil shale leaseholds. Part A: Comments on the approach taken and recommendations for continuing program. Part B: Comments on the data acquisition and management
[DOE/EV-70031/4-PT-A/B] N80-13723

OKLAHOMA
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595

OPERATING SYSTEMS [COMPUTERS]
Spacelab interface development test, volume 1, sections 1-6
[NASA-CR-160411] N80-13149
The George 3 and 4 accounting system
[RAE-TR-78080] N80-13983

OPERATIONS RESEARCH
Guidelines for mission integration, a summary report
[NASA-CR-161347] N80-13067
Infinite server queuing systems with renewal clearing and related models
N80-13832

OPERATOR PERFORMANCE
The automobile driving simulator for anthropogenic research
[FB-41] N80-13779

OPERATORS [MATHEMATICS]
Application of the boson polynomials of u[n] to physical problems
[LA-UR-78-2395] N80-13850
Invariant subspaces associated with decomposition
N80-13874

OPTICAL COMMUNICATION
Optical digital techniques
[NASA-CR-160392] N80-13922

OPTICAL MEASURING INSTRUMENTS
Report of Optical Radiometric Instruments and Calibration Panel --- spaceborne instrumentation technology
N80-13154

OPTICAL PUMPING
An investigation of the technical feasibility of using pulsed optical pumping to eliminate the light shift and improve the longterm stability of passive rubidium frequency standards
[AD-A073757] N80-13925

OPTICAL RADAR
Lidar observations at 0.7-micrometers and 10.6-micrometers wavelengths during dusty infrared test 1
[DIRT 1]
[AD-A073330] N80-13340

OPTICAL WAVEGUIDES
Radiation fields of dielectric optical waveguides
N80-13325
Transmission of free-running laser pulses of high energy and power densities through previously gamma radiated fiber waveguides
[SAND-79-0441] N80-13462

OPTIMAL CONTROL
On the optimization of spring elasticity, damping, and inertia effects on the spring loading of a control stick
[FB-37] N80-13776
Control kernels and constant-rate jump processes
N80-13836

OPTIMIZATION
Optimal design of flexible chemical processes
N80-13187
Optimization of an analytical electron microscope for X-ray microanalysis: Instrumental problems
[CONF-790418-6] N80-13432
Optimal design of open-linkage mechanical systems --- optimizing human performance
N80-13469
Structural optimization under shock and vibration environment
N80-13496
Optimal design of elastic structures for stability under multiple loads
N80-13504
Process optimization of industrial energy use
[BNL-26482] N80-13650
Expression continuity and the formal differentiation of algorithms
N80-13797
Parallel interactive processing in shaded color graphics
N80-13801
An investigation of optimization techniques for drawing computer graphics displays
[NASA-CR-162509] N80-13814
Distributed database organization for optimal computer network response time
N80-13828

ORBIT CALCULATION
Determination and geophysical intepretation of the orbit of China 2 rocket [1971-18B]
[RAE-TR-78107] N80-13137
ORBIT DECAY
Determination and geophysical intepretation of the orbit of China 2 rocket [1971-18B]
[RAE-TR-78107] N80-13137
ORBIT TRANSFER VEHICLES
Orbital Transfer Vehicle [OTV] engine study. Phase A: Extension
[NASA-CR-161338] N80-13160
ORBITALS
Determination of the vacancy formation enthalpy for high purity Ni
[BNL-26191] N80-13971
ORGANIC COMPOUNDS
Conversion of biomass from agriculture into useful products --- cellulose hydrolysis and butanediol fermentation
[COO-4298-1] N80-13278
ORTHOGONALITY
Star tracker error analysis: Roll-to-pitch nonorthogonality
[NASA-TM-80835] N80-13134
Evaluation of integrals whose integrands are oscillatory and singular
N80-13838
ORTHOTROPIC CYLINDERS
A new equilibrium finite element analysis of stresses in orthotropic cylinders with temperature dependent material properties
N80-13506
ORTHOTROPIC PLATES
Reduction methods for problems of vibration of orthotropic plates. Part 1: Exact methods
N80-13309
The shock and vibration digest, volume 11, number 6
[AD-A070464/3] N80-13499
Reduction methods for problems of vibration of orthotropic plates. Part 2: Generalized reduction method for generally orthotropic plates with arbitrary shape
N80-13501
OSCILLATING FLOW
Unsteady turbulence in oscillating flow
[AAAF-NT-79-11] N80-13009
Steady and oscillatory Marangoni convection in floating zones under 1g
N80-13111
A review of research into oscillating boundary layers
[AAAF-NT-79-04] N80-13423
First results of a study on turbulent boundary layers in an oscillating flow with a mean adverse pressure gradient
[AAAF-NT-79-05] N80-13424
OSCILLATIONS
Investigation of high frequency oscillations in the OV102 elevon actuation subsystems using continuous system modeling program simulation
[NASA-CR-160407] N80-13151
OSCILLATORS
Development of two monolithic integrated circuits and a 10-kHz Tape Automated Bonded [TAB] hybrid microcircuit oscillator
[AD-A073565] N80-13368
Nonlinear optics: Parametric amplification at 16 micrometers and oscillator mode competition
[LA-7850-T] N80-13927
OSMOSIS
Membrane oxygen enrichment cost and application evaluation
[ANL-78-108] N80-13205
OUTLIERS [LANDFORMS]
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
OVERVOLTAGE
Determining load characteristics for transient performances. Volume 3: Procedure for modeling power system loads --- mathematical model to predict transient response to overvoltage
[EPRI-EL-849-VOL-3] N80-13381
OXIDATION
Optical reflectance studies of adsorption and reaction on platinum
N80-13183
Combustion of solid carbon rods in zero and normal gravity
[NASA-TM-79303] N80-13404
OXIDE FILMS
Metal silver-liquid interface: Oxide properties from reflectance and scattered light spectroscopy
[COO-4381-7] N80-13235
OXIDES
Oxygen diffusion in close packed oxides
N80-13179
Creep behavior of precipitation and oxide dispersion strengthened superalloys
N80-13213
Reactions of calcium orthosilicate and barium zirconate with oxides and sulfates of various elements
[NASA-TM-79272] N80-13256
OXYGEN
Oxygen diffusion in close packed oxides
N80-13179
Multiplicity and stability of nonadiabatic hydrogen-oxygen-nitrogen flames --- mathematical models
N80-13185
Oxygen electrodes for energy conversion, storage, and conservation: Investigation of simple and mixed oxides
N80-13620
OXYGEN MASKS
Anti-suffocation valve Bendix type no. 3267010-0101
[AD-A068927] N80-13772
OXYGEN PRODUCTION
Membrane oxygen enrichment cost and application evaluation
[ANL-78-108] N80-13205
OXYGEN SUPPLY EQUIPMENT
Anti-suffocation valve Bendix type no. 3267010-0101
[AD-A068927] N80-13772
OZONE
Design and analysis of transient high voltage electrical devices: Ozone production in fast pulsed dielectric barrier discharges in oxygen and modeling of an intense relativistic electron beam source
N80-13890

P

P-N-P-N JUNCTIONS
Latch-up control in CMOS integrated circuits
[SAND-79-0646C] N80-13382
PACIFIC OCEAN
OTEC thermal response report for Pacific plant ship, 5 to 10 deg N 90 to 95 deg W
[HCP/T2898-01/3] N80-13656
PACKING DENSITY
Cost analysis of packed beds for thermal energy storage
[CAES-11] N80-13687
PAIN
The effects of context on the structure of pain
N80-13761
PAIN SENSITIVITY
The effects of context on the structure of pain
N80-13761
PALEONTOLOGY
Devonian paleocurrents of the Applachian basin --- gas production
[METC/CR-79/22] N80-13735
PALLADIUM ALLOYS
The elastic modulus and diffusion coefficents of silver-palladium composition modulated foils
N80-13216
PARALLEL PROCESSING [COMPUTERS]
Parallel interactive processing in shaded color graphics
N80-13801
Bounded nondeterminism and the parallel parsing of context-free languages
N80-13804
The design and evaluation of algorithms for parallel processing
N80-13805
PARAMETERIZATION
Inclusion of unsteady aerodynamics in longitudinal parameter estimation from flight data --- use of vortices and mathematical models for parameterization from flight characteristics
[NASA-TP-1536] N80-12995
Analysis of reentry vehicle trajectory reconstruction and parameter identification
[SAND-79-1365C] N80-13136
Invariant tests for scale parameters under elliptical symmetry
N80-13855
Scaling studies of beam-heated tokamaks
[ORNL/TM-6584] N80-13939
Polarization parameter measurement for K+p elastic scattering below 1 Ge/V/c
N80-13959
PARAMETRIC AMPLIFIERS
Nonlinear optics: Parametric amplification at 16 micrometers and oscillator mode competition
[LA-7850-T] N80-13927
PARSING ALGORITHMS
Bounded nondeterminism and the parallel parsing of context-free languages
N80-13804
PARTICLE ACCELERATOR TARGETS
Relativistic electron bean energy deposition in thin gold and aluminum targets
[SAND-78-2026] N80-13901
PARTICLE BEAMS
Transfer map approach to the beam-beam interaction --- mathematical model describing particle motion in particle beam interactions
[LA-UR-79-1752] N80-13913
Technical review of the Sandia Laboratories' Particle Beam Fusion Program
[SAND-79-7044] N80-13940
PARTICLE COLLISIONS
Bunched-beam p-p[-] and p-p collisions
[BNL-26240] N80-13916
PARTICLE ENERGY
Particle boundary structures at the magnetopause and the plasma sheet
N80-13547
PARTICLE FLUX DENSITY
Multiple-satellite observations of large scale trapping boundary motions
N80-13549
STARE ionospheric electron flows during the August 28, 1978 GEOS-2 magnetopause crossing
N80-13552
PARTICLE MOTION
Transfer map approach to the beam-beam interaction --- mathematical model describing particle motion in particle beam interactions
[LA-UR-79-1752] N80-13913
PARTICLE SIZE DISTRIBUTION
Carbon particulate measurements in a diesel engine --- particle size distribution
[SAND-79-8210] N80-13725
PARTICLE THEORY
An electric-current model of the magnetosphere
N80-13531
PARTICLES
Particle impact damage in silicon nitride, part 3
[AD-A073570] N80-13172
PARTITIONS [MATHEMATICS]
Dominant partition method --- based on a wave function formalism
[NASA-TM-80778] N80-13851
PASSENGERS
Fire-resistant materials for aircraft passenger seat construction
[NASA-TM-78617] N80-13255
PATTERN RECOGNITION
Image segmentation by statistical edge detection and sequential edge growing
N80-13831
Pattern recognition methods for acoustic emission analysis
[NUREG-CR-0910] N80-13883
PAYLOAD INTEGRATION PLAN
Life science payloads planning study integration facility survey results
[NASA-CR-160390] N80-13064
Life science payloads planning study integration facility survey: Executive summary
[NASA-CR-160391] N80-13065
Office of Aeronautics and Space Technology preliminary requirements for space science and applications platform studies
[NASA-CR-161346] N80-13066
PAYLOADS
Life science payloads planning study integration facility survey: Executive summary
[NASA-CR-160391] N80-13065
Office of Aeronautics and Space Technology preliminary requirements for space science and applications platform studies
[NASA-CR-161346] N80-13066
Experiment modules and facilities in TEXUS 1 and 2
N80-13092
PDP 11 COMPUTER
PDP-11 computer monitoring system
[AD-A072966] N80-13790
PENETRATION
Method for describing nearly normal penetration of an ogive nosed penetrator into terrestrial targets
[SAND-79-0721] N80-13479
PENETROMETERS
Development of in situ marine seismic and geotechnical instrumentation systems
[SAND-79-0868C] N80-13431
PENNSYLVANIA
Development of mining guidance and control systems
[NASA-TM-78226] N80-13601
PENTOSE
Conversion of biomass from agriculture into useful products --- cellulose hydrolysis and butanediol fermentation
[COO-4298-1] N80-13278
PERCEPTION
The effects of context on the structure of pain
N80-13761
PERFORMANCE PREDICTION
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 3: Library of maps
[NASA-CR-159693] N80-13045
Performance measurement and analysis of certain search algorithms
N80-13803
Effect of program modifications on software performance
N80-13806
Determination of the intensity of scattered radiation and the performance of grids in diagnostic radiology by Monte Carlo methods
N80-13921
Derivation of a quantitative model to assess the performance of research and development organizations
N80-13981
PERFORMANCE TESTS
High speed ejectors --- investigation of ejector performance in compressible flow
[AD-A073378] N80-13051

Hg ion thruster component testing
[NASA-TM-79287] N80-13159
Gas generator research and development: BI-GAS process
[FE-1207-62] N80-13288
Feasibility study of an active system for transformer noise abatement
[COO-4376-T1] N80-13378
Ceramic capacitors: A comparative investigation of the quality and stability of 23 manufactures and types, including disc, plate and multilayer capacitors
[ECR-87] N80-13387
A comparison of control simulators having force inputs and displacement feedback. Applications to the manual control of underwater vehicles
[FB-38] N80-13777
Performance of a pressurized multiwire proportional chamber for neutron radiography
[LBL-9316] N80-13897

PERIODIC VARIATIONS
Investigations on unsteady pressure distribution measurements in rotating systems
[ESA-TT-503-REV] N80-13059

PERTURBATION THEORY
A suggestion as to a general derivation of the equations of motion of a deformable aircraft for small perturbations which will be most generally acceptable
[RAE-TR-79011] N80-13038
Delta-Rho, a second order trajectory perturbation technique
N80-13133
Dynamic snap-through of shallow arches and spherical caps
N80-13299
Recent developments for the nonlinear distortion of non-dispersive acoustic waves. Part 1: Planar waves and the basic method
N80-13311

PETRI NETS
Fault test generation for sequential circuits: A search directing heuristic
N80-13353

PETROLEUM PRODUCTS
Phase behavior and interfacial tension studies of surfactant systems
N80-13395

PHASE COHERENCE
Large scale coherent structures in the wake of axisymmetric bodies --- wind tunnel investigation
[DFVLR-FB-78-28] N80-13007

PHASE DIAGRAMS
Computational of physical and chemical equilibria
N80-13184

PHASE LOCK DEMODULATORS
Count state analysis of a digital phase locked loop
N80-13352

PHASE SHIFT KEYING
Error performance of differentially coherent detection of binary DPSK data transmission on the hard-limiting satellite channel
[AD-A073377] N80-13337

PHASE TRANSFORMATIONS
Dispersed gaseous and solid phases in molten and solidified Cu
N80-13080
Thermodynamics and dynamics of line phases
N80-13105
Analytical electron microscope study of the omega phase transformation in a zirconium-nobium alloy
[ORNL/TM-6705] N80-13240
Transient thermal analysis of phase change material energy storage system
N80-13618

PHASED ARRAYS
Design and fabrication on microstrip disk antenna arrays
N80-13328
Overlapped sub-array scanning antenna study
[AD-A070939] N80-13339

PHENOLOGY
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590

PHENOMENOLOGY
Phenomenology of heavy leptons and heavy quarks
[SLAC-PUB-2226] N80-13904

PHOSPHATES
The parachor and the P yields O bond
[AD-A073410] N80-13168

PHOSPHONIUM COMPOUNDS
The parachor and the P yields O bond
[AD-A073410] N80-13168

PHOSPHORIC ACID
Integral cell scale-up and performance verification
[EPRI-EM-1134] N80-13646

PHOTOCHEMICAL REACTIONS
Laser induced photochemistry
[SAN-115/136-1] N80-13203
Photochemistry of dinitrogen pentoxide
[LBL-9034] N80-13206

PHOTOCONDUCTIVITY
Dual photoconductivity effects induced by the intersubband transitions in n-type silicon inversion layers
N80-13962

PHOTOELASTICITY
Surface-crack characterization by use of dynamic photoelastic spectroscopy
[IS-M-211] N80-13514

PHOTOELECTRIC EMISSION
Dual photoconductivity effects induced by the intersubband transitions in n-type silicon inversion layers
N80-13962

PHOTOGEOLOGY
Remote sensing applied to geology. Citations from the International Aerospace Abstracts data base
[NTIS/PS-79/0822/1] N80-13613

PHOTOINTERPRETATION
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
Interactive aids for cartography and photo interpretation --- aerial photography
[AD-A073452] N80-13603

PHOTOLYSIS
The water splitting light reaction of chlorophyll a dihydrate. Visible light solar energy conversion after the primary reaction in plant photosynthesis
N80-13188

PHOTOMETERS
Evaluation and application of an intensified CCD array photometer for astronomical observations
N80-13995

PHOTON-ELECTRON INTERACTION
Resonant Raman scattering from electron-phonon coupled modes in 3-V semiconductors
N80-13356

PHOTONICS
Photonic compression --- laser fusion to measure high pressure equations of state
[LA-UR-79-2040] N80-13973

PHOTONS
Simulation studies for a nuclear photon pumped excimer laser
N80-13452
Multiple-photon excitation of polyatomic molecules in a strong optical field: A universal normalization
[LA-UR-79-1524] N80-13896

PHOTORECEPTORS
Effects of ionizing radiation on the light sensing elements of the retina
[LBL-5683] N80-13767

PHOTOSYNTHESIS
The water splitting light reaction of chlorophyll a dihydrate. Visible light solar energy conversion after the primary reaction in plant photosynthesis
N80-13188
Photosynthetic carbon reduction by seagrasses exposed to ultraviolet A radiation
[NASA-CR-160397] N80-13757
A preliminary research plan for development of a photosynthetic link in a closed ecological life support system
[NASA-CR-160399] N80-13758

PHOTOVOLTAGES
Classification and technical review of dc-ac inverters for use in photovoltaic power systems
[COO-4094-25] N80-13377

PHOTOVOLTAIC CELLS
Evaluation of cleaners for photovoltaic modules exposed in an outdoor environment
[NASA-TM-79248] N80-13317
Evaluation of combined photovoltaic/thermal collectors
[COO-4577-8] N80-13665
Photovoltaic concentrator application experiment. Phase 1: A 150 kW photovoltaic concentrator power system for load-center applications with feedback into the utility grid
[DOE/CS-34267/1] N80-13688
Photovoltaic systems. Program summary
[DOE/ET-0019/2] N80-13691
Test plan for the Mead 25-kW Photovoltaic Flexible Test Facility, 1979
[COO-4094-53] N80-13692
Photovoltaic transient analysis program user's guide. Volume 1: Executive summary
[SAND-78-7038-VOL-1] N80-13704

PHYSICAL FITNESS
Development and description of a device for static strength measurement in the armed forces examination and entrance station
[AD-A068684] N80-13765

PICOSECOND PULSES
Broadly tunable picosecond IR source
[LA-UR-79-1474] N80-13928

PIEZOELECTRICITY
Selected papers on piezoelectricity and impulsive 'pressure' measurements
[SAND-78-1911] N80-13974

PIPE FLOW
Experimental investigations of nonequilibrium flashing of water in a converging-diverging nozzle
[BNL-NUREG-25716] N80-13417

PIPES [TUBES]
Heat-transfer in helically coiled tubes with laminar flow
N80-13393
Automated welding of nuclear piping systems --- gas tungsten arc welding in nuclear power plants
[CONF-790841-1] N80-13478
Materials testing for central receiver solar-thermal power systems
[TID-29443] N80-13695

PISTON ENGINES
Exhaust emissions characteristics for a general aviation light aircraft Teledyne Continental Motors 6-285-B piston engine
[AD-A074338] N80-13042

PITCH [INCLINATION]
Star tracker error analysis: Roll-to-pitch nonorthogonality
[NASA-TM-80835] N80-13134

PITCHING MOMENTS
Parametric study of the Orbiter rollout using an approximate solution
[NASA-TM-80837] N80-13148

PITOT TUBES
Air flow measurements in a large irregularly shaped tunnel using anemometer and pitot-static tube traverse
[NEL-660] N80-13061
Pitot tube and drag body measurements in transient steam-water flows
[CONF-790505-15] N80-13416

PLAINS
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597

PLANAR STRUCTURES
Dynamic analysis of flexible mechanisms
N80-13502
Planar Josephson junction radiation detector
N80-13958

PLANE WAVES
A theory of viscoelastic analogy for wave propagation in elastic and viscoelastic layered media
N80-13392

PLANETARY ROTATION
Spindown of rotating magnets --- astrophysical bodies
N80-13564

PLANETARY SURFACES
Photopolarimetry of scattering surfaces and their interpretation by computer model
[NASA-CR-162514] N80-14002

PLANTING
A report on field work in the city of Paragominas [PA]
[E80-10001] N80-13587

PLASMA CLOUDS
Compton shift of X-rays in plasma clouds: Typical radiation spectra
[PR-441] N80-14000

PLASMA COMPOSITION
First observations of the hot ion composition in the high altitude magnetospheric boundary layer by means of Prognoz-7
N80-13539

PLASMA CONTROL
The study of MHD instabilities in elongated tokamaks --- plasma control
N80-13935

PLASMA DIFFUSION
Improved bondability to RTV silicone elastomer using rf-activated gas
[BDX-613-2157] N80-13260

PLASMA EQUILIBRIUM
Equilibrium plasma corona surfaces
[UCID-18228] N80-13942

PLASMA HEATING
First observations of a heated plasma component in the plasma mantle
N80-13538
Phase measurements of fast wave toroidal eigenmodes --- resonant frequencies
N80-13931
Multimegawatt neutral beams for Tokamaks
[LBL-8891] N80-13938
NFREYA: A Monte Carlo beam deposition code for noncircular Tokamak plasmas
[ORNL/TM-6845] N80-13944
Solution of the initial value problem and energy redistribution for electron and Alfven waves in inhomogeneous plasmas
[REPT-78-115] N80-13945

PLASMA INTERACTIONS
A microscopic description of interpenetrated plasma regions
N80-13568

PLASMA JETS
Damage of metal surfaces by a hot, dense deuterium plasma
N80-13212
Arc-coal acetylene process development program
[COO-4507-4] N80-13282
Analysis of the anode boundary layer of a high pressure-high current arc
N80-13358
Investigation into the effect of plasma pretreatment on the adhesion of parylene to various substrates
[NASA-TM-79224] N80-13473

PLASMA LAYERS
Ion and electron layers at the magnetopause: ISEE-2 N80-13545
Particle boundary structures at the magnetopause and the plasma sheet N80-13547
PLASMA PHYSICS
Equilibrium plasma corona surfaces [UCID-18228] N80-13942
Surface motion and confinement potential for a microwave confined corona [UCID-18227] N80-13943
PLASMA POTENTIALS
Surface motion and confinement potential for a microwave confined corona [UCID-18227] N80-13943
PLASMA SHEATHS
Iron line emission from the Alfven shell in X-ray binaries [PR-450] N80-13998
PLASMA TURBULENCE
Ion sound turbulence in the solar wind N80-14009
PLASMA WAVES
Laser driven breakdown-heating waves in magnetized hydrogen --- gas dissociation N80-13933
PLASMA-ELECTROMAGNETIC INTERACTION
A wave-particle-wave interaction observed on GEOS-2 N80-13543
Kinetic theory of the boundary layer between a flowing isotropic plasma and a magnetic field N80-13567
Electromagnetic lower hybrid instabilities in an inhomogeneous plasma N80-13934
PLASMA-PARTICLE INTERACTIONS
The solar wind interaction with Venus N80-13561
PLASMAS [PHYSICS]
Plasma cleaning end-of-process detection --- using optical emission techniques [BDX-613-2229-REV] N80-13384
Plasma structure of the magnetopause and boundary layer N80-13532
Impulsive penetration and viscous interaction N80-13577
Equilibrium plasma corona surfaces [UCID-18228] N80-13942
PLASTIC COATINGS
Investigation into the effect of plasma pretreatment on the adhesion of parylene to various substrates [NASA-TM-79224] N80-13473
PLASTIC DEFORMATION
Stress-assisted isothermal martensitic transformation and transformation plasticity [AD-A073433] N80-13222
Approximate techniques for plastic deformation of structures under impulsive loading, 2 N80-13313
Modelling of crack tip deformation with finite element method and its aplications N80-13503
Dynamic edge dislocation displacements and Peierls strains in a linear elastic strip [UCRL-52787] N80-13523
PLASTIC FLOW
Plastic flow of mild steel under proportional and non-proportional straining at a controlled rate [OUEL-1280/79] N80-13241
PLASTIC PROPERTIES
Dynamic plastic buckling of shells: A reconsideration of the Vaughan-Florence analysis [CONF-790802-1] N80-13518
PLATINUM
Optical reflectance studies of adsorption and reaction on platinum N80-13183
PLOTTING
An investigation of optimization techniques for drawing computer graphics displays [NASA-CR-162509] N80-13814
PLUTONIUM OXIDES
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program [LA-7952-PR] N80-13911
POLAR REGIONS
External plasma flow --- as observed by heos-2 N80-13533
POLARIMETRY
Photopolarimetry of scattering surfaces and their interpretation by computer model [NASA-CR-162514] N80-14002
POLARIZATION [CHARGE SEPARATION]
Cell adhesion as influenced by substrate surface properties N80-13252
POLARIZATION CHARACTERISTICS
Polarization parameter measurement for K+p elastic scattering below 1 Ge/V/c N80-13959
POLLUTION MONITORING
Remote sensing applied to environmental pollution detection and management. A bibliography with abstracts [NTIS/PS-79/0842/9] N80-13614
Instrumentation for environmental monitoring [LBL-9323] N80-13722
Strategies for the surveillance of coastal waters of the Federal Republic of Germany [BMFT-FB-M-77-11] N80-13726
POLYATOMIC MOLECULES
Multiple-photon excitation of polyatomic molecules in a strong optical field: A universal normalization [LA-UR-79-1524] N80-13896
POLYCRYSTALS
Fracture studies in ceramics with particular emphasis on beta'-alumina N80-13243
Microstructure, sintering and strength of polycrystalline SiC [LBL-9257] N80-13976
POLYESTER RESINS
Synthesis of improved polyester resins [NASA-CR-159665] N80-13257
POLYETHYLENE TEREPHTHALATE
Thermal shrinkage mechanisms of poly[ethylene terephthalate] fibers N80-13246
POLYETHYLENES
Corona-discharge treatment of polymeric films. 2: Chemical studies [UCRL-82709] N80-13263
POLYMER CHEMISTRY
Formation of block polymers involving poly-[P-xylelene] blocks N80-13251
Synthesis of improved polyester resins [NASA-CR-159665] N80-13257
POLYMER MATRIX COMPOSITE MATERIALS
Improved fiber retention by the use of fillers in graphite fiber/resin matrix composites [NASA-TM-79288] N80-13171
Evaluation of polar and non-polar plastics compounded with thermomechanical wood fibers N80-13247
POLYMERIC FILMS
Corona-discharge treatment of polymeric films. 2: Chemical studies [UCRL-82709] N80-13263
Shock-induced electrical switching in polymeric films [CONF-790540-11] N80-13264
POLYMERIZATION
Preparation and characterization of polymers formed by irradiation of beta-pinene and other monomers N80-13249
Formation of block polymers involving poly-[P-xylelene] blocks N80-13251
POLYMERS
Formation of block polymers involving poly-[P-xylelene] blocks N80-13251
Design and development of a 30 watt solid polymer electrolyte fuel cell power source fueled with calcium hydride [AD-A071157] N80-13625
POLYNOMIALS
Application of the boson polynomials of u[n] to physical problems [LA-UR-78-2395] N80-13850
POLYSTYRENE
Microscopic mechanisms and mechanics of craze growth and fracture in polystyrene N80-13507
POLYURETHANE RESINS
Magnetic resonance studies of epoxy resins and polyurethanes [AD-A073590] N80-13173
PORTABLE EQUIPMENT
Portable high-temperature, high-pressure viscometer development [SAND-78-1409] N80-13433
POSITION [LOCATION]
Experimental determination of position-estimate accuracy using back-azimuth signals from a microwave landing system [NASA-TP-1574] N80-13020
Positional error analysis, A-10 aircraft on three-axis ground mount [AD-A073600] N80-13336
POSITION INDICATORS
In-service improvements and modernization of all components of the instrument landing systems. Volume 1: Sections 1-10 [AD-A074425] N80-13018
In-service improvements and modernization of all components of the instrument landing systems. Volume 2: Sections 11 and 12 [AD-A074426] N80-13019
POSITIONING DEVICES [MACHINERY]
Positioning and mixing instrumentation employing electrostatic and acoustic principles N80-13088
POSITRON ANNIHILATION
Determination of the vacancy formation enthalpy for high purity Ni [BNL-26191] N80-13971
POSITRONS
Determination of the vacancy formation enthalpy for high purity Ni [BNL-26191] N80-13971
POTENTIAL THEORY
Aerodynamic preliminary analysis system. Part 1: Theory --- linearized potential theory [NASA-CR-145284] N80-12998
Numerical solution of two-dimensional potential theory problems using integral equation techniques N80-13835
POTTING COMPOUNDS
Development of alternate silicone potting compounds. Volume 5: Development of substitute no. 1 for Dow Corning's aerospace sealant DC93-122 [UCRL-52434-VOL-5] N80-13374
POWER CONDITIONING
Heat pipe cooled power magnetics [NASA-CR-159659] N80-13362
Photovoltaic concentrator application experiment. Phase 1: A 150 kW photovoltaic concentrator power system for load-center applications with feedback into the utility grid [DOE/CS-34267/1] N80-13688
POWER REACTORS
Time-dependent fracture of materials at elevated temperature --- conference [CONF-790236] N80-13520
POWER SERIES
Modified power law equations for vertical wind profiles [NASA-TM-79275] N80-13623
PREAMPLIFIERS
User's handbook for GT8 galvanometer drive amplifier system [OUEL-1284/79] N80-13436
PRECIPITATION PARTICLE MEASUREMENT
Dayside aurora and substorm current systems N80-13555
PREDICTION ANALYSIS TECHNIQUES
Assessment of a method for predicting the drag and boundary layer development on a body of revolution at zero incidence [AMTE[N]-R-78111] N80-13006
The effect of analysis bandwidth on the accuracy of measurements and predictions of single degree of freedom system behavior [AMTE[N]-TM-79401] N80-13526
Antiparallel merging, the half-wave rectifier response of the magnetosphere, and convection N80-13573
PREMIXED FLAMES
Studies of premixed hydrogen flames --- flame extinction N80-13190
PREPOLYMERS
Synthesis of improved polyester resins [NASA-CR-159665] N80-13257
PRESSURE BREATHING
Modeling studies of the pressure-flow relationship of the central airways N80-13763
PRESSURE CHAMBERS
Performance of a pressurized multiwire proportional chamber for neutron radiography [LBL-9316] N80-13897
PRESSURE DISTRIBUTION
Evaluation of airjet distortion generator used to produce steady-state, total-pressure distortion at the inlet of a General Electric F101-GE-100 turbofan engine [AD-A072743] N80-13049
Investigations on unsteady pressure distribution measurements in rotating systems [ESA-TT-503-REV] N80-13059
PRESSURE EFFECTS
Effect of pressure on structure and NO sub X formation in CO-air diffusion flames [NASA-TP-1448] N80-13191
Coalification reactions under pressure [MLM-2556[TR]] N80-13284
PRESSURE GRADIENTS
A review of research into oscillating boundary layers [AAAF-NT-79-04] N80-13423
First results of a study on turbulent boundary layers in an oscillating flow with a mean adverse pressure gradient [AAAF-NT-79-05] N80-13424
PRESSURE MEASUREMENTS
Contributions of shock-wave physics to high-pressure standards --- high pressure measurements using shock waves [LA-UR-79-2039] N80-13875
Selected papers on piezoelectricity and impulsive 'pressure' measurements [SAND-78-1911] N80-13974
PRESSURE OSCILLATIONS
Analysis of combustion instability in liquid fuel rocket motors [NASA-CR-159733] N80-13164
PRESSURE SENSORS
Flutter spectral measurements using stationary pressure transducers [NASA-TM-79293] N80-13046

PRESSURE VESSELS
Development of automated welding processes for field fabrication of thick-walled pressure vessels: Electron beam method
[DOE/ET-2606/4] N80-13476
Development of automated welding processes for field fabrication of thick-walled pressure vessels: Electron beam method
[FE-2606-5] N80-13484
Fractographic study of a thick wall pressure vessel failure --- safety and reliability of nuclear pressure vessels
[CONF-790730-2] N80-13522
Application of static and dynamic crack arrest theory to thermal shock experiment TSE-4 --- fracture behavior of reactor pressure vessels
[NUREG-CR-0767] N80-13524
Interim structural design standard for solar energy applications, phases 1 and 2 --- boiler and pressure vessel code
[SAND-79-8183] N80-13698
PRESSURE WELDING
Application of inertia welding technology to steel disc-type flywheels
[UCRL-15045] N80-13652
PRISMATIC BARS
Experiment and prediction in the bending of a nickel beam at 200 deg C
[COO-2733-21] N80-13519
PROBABILITY DENSITY FUNCTIONS
Discussion of paper by Good and Gaskins on density estimation and bump hunting
[AD-A073269] N80-13867
PROBABILITY DISTRIBUTION FUNCTIONS
Extensions of a simple model with applications in reliability, extinction of species, inventory depletion and urn sampling
[AD-A073814] N80-13492
Nonparametric families of life distributions. 1: Extreme points. Characteristics
N80-13859
Extreme mean and its applications --- the p-th probability truncated normal distribution
[NASA-TM-81346] N80-13863
PROBLEM SOLVING
Mathematical problems arising from passive intermodulation interference in communications satellites
N80-13321
On congruence subgroup problem and related topics
N80-13873
PRODUCTION ENGINEERING
Arc-coal acetylene process development program
[COO-4507-4] N80-13282
Development of methods of producing large areas of silicon sheet by the slicing of silicon ingots using inside diameter [I.D.] saws
[NASA-CR-162520] N80-13621
Mounting procedure for high quality optical systems
[BMFT-FB-T-78-19] N80-13929
PROGRAM VERIFICATION [COMPUTERS]
Generating correct programs from logic specifications
N80-13799
Effect of program modifications on software performance
N80-13806
On some graph-theoretic problems in program testing
N80-13811
Verification of encapsulated implementations of algebraically specified data types
N80-13812
Summary of technical progress, investigation of software models
[AD-A073639] N80-13819
Preliminary reference manual for the Green programming language: A language designed in accordance with the Ironman requirements
[AD-A073661] N80-13820
Reliable microprogramming
[AD-A073454] N80-13826
PROGRAMMING LANGUAGES
A specification of data structures with application to data base systems
N80-13782
Comparison of direct code generation and intermediate language generation for bootstrapping the machine-independent compiler, LITTLE
N80-13798
Verification of encapsulated implementations of algebraically specified data types
N80-13812
Preliminary reference manual for the Green programming language: A language designed in accordance with the Ironman requirements
[AD-A073661] N80-13820
PROJECT MANAGEMENT
Reliability and maintainability management manual --- quality control and reliability engineering in management planning for project management
[AD-A073299] N80-13491
Photovoltaic systems. Program summary
[DOE/ET-0019/2] N80-13691
US program for the immobilization of high-level nuclear wastes
[DP-MS-79-2] N80-13917
The work request system of a NASA Q1 package
[NASA-CR-162511] N80-13982
PROJECT PLANNING
Installation criteria for the Approach Lighting System Improvement Program [ALSIP]
[AD-A070076] N80-13057
Space construction system analysis, final review. Part 1: Executive summary
[NASA-CR-160286] N80-13063
Life science payloads planning study integration facility survey results
[NASA-CR-160390] N80-13064
Life science payloads planning study integration facility survey: Executive summary
[NASA-CR-160391] N80-13065
Low NO[x] heavy fuel combustor program
[NASA-TM-79313] N80-13624
Systems engineering for power, program report
[DOE/ET-0012/2-REV] N80-13637
Fundamental economic issues in the development of small-scale hydro
[DOE/RA-23-216.00.0-02] N80-13667
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7952-PR] N80-13911
PROPELLANT COMBUSTION
Laser ignition of solid propellant formulations
[AD-A073316] N80-13270
PROPELLANT TESTS
Reflected blast measurements at small scaled distances for M26E1 propellant
[AD-A073409] N80-13269
PROPORTIONAL LIMIT
The implementation and practical verification of a superposition method for the solution of elastic crack problems
[RAE-TM-STRUCT-940] N80-13527
On the optimization of spring elasticity, damping, and inertia effects on the spring loading of a control stick
[FB-37] N80-13776
PROPULSION SYSTEM PERFORMANCE
Force and moment data from a wind-tunnel test of a tilt-nacelle V/STOL propulsion system with an attitude control vane --- conducted in Ames 40 by 80 foot wind tunnel
[NASA-TM-81157] N80-13003
Impact of flywheel-transmissions on automobile performance: A logical basis for evaluation
[UCRL-52758] N80-13480
PROTECTIVE COATINGS
Development of tungsten coatings for the corrosion protection of alumina-based ceramics
[CONF-790442-13] N80-13261
Application of coatings by high energy CW lasers
[AD-A073347] N80-13456
Investigation into the effect of plasma pretreatment on the adhesion of parylene to various substrates
[NASA-TM-79224] N80-13473
PROTON BEAMS
Bunched-beam p-p[-] and p-p collisions
[BNL-26240] N80-13916
PROTON-PROTON REACTIONS
An orbital localization method and an iterative procedure for calculating nuclear magnetic resonance coupling constants
N80-13189
PROTONS
Polarization parameter measurement for K+p elastic scattering below 1 Ge/V/c
N80-13959
PSYCHOACOUSTICS
Effects of sound level fluctuations on annoyance caused by aircraft-flyover noise
[NASA-TP-1576] N80-13880
PULSARS
The magnetospheres of magnetic A stars and of pulsars
N80-13565
The boundary of a pulsar magnetosphere: Gamma-ray pulsars
N80-13566
PULSE AMPLITUDE
Count state analysis of a digital phase locked loop
N80-13352
PULSE COMMUNICATION
Adaptive algorithms for reduction of interchannel and intersymbol interference in digital communications
N80-13807
PULSE DURATION
University of Illinois nuclear pumped laser program --- experiments with a TRIGA pulsed reactor with a broad pulse and a low peak flux
N80-13444
PULSE GENERATORS
Technical review of the Sandia Laboratories' Particle Beam Fusion Program
[SAND-79-7044] N80-13940
PULSED RADIATION
University of Illinois nuclear pumped laser program --- experiments with a TRIGA pulsed reactor with a broad pulse and a low peak flux
N80-13444
PUMPS
An investigation of the efficiency of regenerative blowers and pumps
N80-13463
MERADCOM/OSU hydraulic system reliability program --- reliability analysis of hydraulic pumps and valves
[AD-A073789] N80-13493
PURIFICATION
Unidirectional solidification of eutectic iron-carbon alloys and the segregation of sulfur
N80-13085
PURSUIT TRACKING
On the interaction between system and task parameters through continuous manual control
[FB-42] N80-13780
PYROLYSIS
Coal conversion in flash hydropyrolysis reactors
[BNL-26209] N80-13294
Review of supporting research at Oak Ridge National Laboratory for underground coal conversion
[CONF-790630-9] N80-13295

Q

QUALITY CONTROL
Stochastic modelling for reliability and other performance measures of software systems with applications
N80-13486
Reliability and maintainability management manual --- quality control and reliability engineering in management planning for project management
[AD-A073299] N80-13491
Scientific literature: Can we keep it from ruining science
[UCRL-81118] N80-13985
QUANTITATIVE ANALYSIS
Quantitative gas analysis using Fourier transform infrared spectroscopy
[SAND-79-0968] N80-13202
Comparison of procedures for quantitative X-ray analysis in thin films
[BNL-25759] N80-13979
QUANTUM MECHANICS
Stimulated Thomson scattering
N80-13330
New methods for quantum mechanical calculations of inelastic atom-molecule collisions and electron scattering
N80-13892
QUANTUM THEORY
Application of the boson polynomials of u[n] to physical problems
[LA-UR-78-2395] N80-13850
QUARKS
Phenomenology of heavy leptons and heavy quarks
[SLAC-PUB-2226] N80-13904
QUARTZ
Hertzian fracture of Pyrex glass and alpha quartz
N80-13510
QUASI-STEADY STATES
Quasi-static electric field build-up between two spherical conductors
[UCID-18236] N80-13372
QUATERNARY ALLOYS
Chemistry and heat treatment effects on mechanical and microstructural properties of heat-treated, beta-extruded Ti-6Al-6V-2Sn
[BDX-613-2170-REV] N80-13224
QUENCHING [COOLING]
Studies of premixed hydrogen flames --- flame extinction
N80-13190
Internal combustion engine sampling probes: A study of sample-gas origins, flow disturbances and quench-layer bias
N80-13468
QUEUEING THEORY
The modeling of virtual memory systems --- computer networks
N80-13789
Queues and stores with nonhomogeneous input
N80-13830
Infinite server queuing systems with renewal clearing and related models
N80-13832
Transients effects in M/G/1 queues; an empirical investigation
[AD-A073744] N80-13833
A starting rule for data collection in queueing simulations
[AD-A073622] N80-13842
A stopping rule for data collection in queueing simulations
[AD-A073624] N80-13843

R

RADAR DATA
STARE ionospheric electron flows during the August 28, 1978 GEOS-2 magnetopause crossing
N80-13552
RADAR MEASUREMENT
Radar measurements of temperatures and ionic composition in the high-latitude ionosphere
N80-13728

RADIAL DISTRIBUTION
Radial discontinuities in low-energy magnetospheric plasma observed on GEOS-1
N80-13537
RADIATION BELTS
Multiple-satellite observations of large scale trapping boundary motions
N80-13549
RADIATION DETECTORS
Development of an airborne gamma radiation system for snow surveys
[EGG-1183-1679] N80-13606
Planar Josephson junction radiation detector
N80-13958
RADIATION DISTRIBUTION
Radiation fields of dielectric optical waveguides
N80-13325
RADIATION EFFECTS
Effect of phase instabilities on the correlation of nickel ion and neutron irradiation swelling in solution annealed 316 stainless steel
[CONF-790657-2] N80-13226
Latch-up control in CMOS integrated circuits
[SAND-79-0646C] N80-13382
Effects of ionizing radiation on the light sensing elements of the retina
[LBL-5683] N80-13767
RADIATION MEASUREMENT
Energy and spectrum measurements of high energy electrons beams using a Cerenkov detector
N80-13898
Measurement and analysis of circumsolar radiation
[LBL-9214] N80-14015
Direct measurements of the spectrum of the near millimeter cosmic background
[LBL-9374] N80-14016
RADIATIVE TRANSFER
An asymptotic expansion approach to the inverse radiative transfer problem --- to infer concentration profiles of the atmosphere from measurements made onboard a satellite
[NASA-TP-1587] N80-13730
RADIO COMMUNICATION
Parameter estimation narrow-band processes with arrays
N80-13332
RADIO FREQUENCIES
Low-cost RF system for a 2-megahertz heavy ion linear accelerator
[BNL-50960] N80-13914
RADIO FREQUENCY INTERFERENCE
Mathematical problems arising from passive intermodulation interference in communications satellites
N80-13321
Adaptive algorithms for reduction of interchannel and intersymbol interference in digital communications
N80-13807
RADIO NAVIGATION
Further development of the Radio-ANA-System
[BMFT-FB-M-78-05] N80-13021
RADIOACTIVE MATERIALS
Heat transfer in high-level waste management
[CONF-790822-1] N80-13919
RADIOACTIVE WASTES
Spent fuel receipt and lag storage facility for the spent fuel handling and packaging program --- structural design criteria for light waste water disposal storage
[DPSTD-SFHP-78-10] N80-13905
Evaluation of the proposed WIPP site in Southeast New Mexico --- waste isolation pilot plant
[SAND-79-1113C] N80-13909
US program for the immobilization of high-level nuclear wastes
[DP-MS-79-2] N80-13917
Technical concept for test of geologic storage of spent reactor fuel in the Climax granite, Nevada Test Site
[UCID-18197] N80-13918
Retrievable storage concept designs
[UCRL-15018] N80-13920
RADIOLOGY
Determination of the intensity of scattered radiation and the performance of grids in diagnostic radiology by Monte Carlo methods
N80-13921
RADIOMETERS
Flight Technology Improvement --- spaceborne optical radiometric instruments, attitude control, and electromechanical and power subsystems
[NASA-CP-2101] N80-13152
Summary of the Flight Technology Improvement Workshop --- spaceborne optical radiometric instruments, attitude control, and electromechanical and power subsystems
N80-13153
Report of Optical Radiometric Instruments and Calibration Panel --- spaceborne instrumentation technology
N80-13154
RAMAN LASERS
An experimental and theoretical investigation of magnetic ordering in Yttrium Iron Garnet --- raman lasers backscattering
N80-13946
RAMAN SPECTRA
Resonant Raman scattering from electron-phonon coupled modes in 3-V semiconductors
N80-13356
RAMAN SPECTROSCOPY
Carbon dioxide concentration and temperature in flames measured by Raman spectroscopy
[SAND-79-8612] N80-13204
RAMJET ENGINES
Experimental investigation of a solid fuel ramjet
[DFVLR-FB-78-27] N80-13485
RANDOM NOISE
Digital detection by digital signal processing techniques --- detection performance in presence of noise introduced by the analog to digital converter
N80-13331
RANDOM PROCESSES
Detection and MMSE estimation of nonlinear memoryless functionals of random processes using the Volterra functional expansion
N80-13355
Stochastic intergration using random point processes
N80-13860
RANGE [EXTREMES]
Extreme mean and its applications --- the p-th probability truncated normal distribution
[NASA-TM-81346] N80-13863
RANKINE CYCLE
Sandia Laboratories operational experience with small heat engines in solar thermal power systems
[SAND-78-2163C] N80-13693
RARE GASES
LaRC results on nuclear pumped noble gas lasers
N80-13446
RATES [PER TIME]
Preparatory studies for an experiment in directional solidification of immiscible Al-In alloys on board a rocket vehicle
N80-13100
REACTION KINETICS
Reactions between glass melts
N80-13101
Space experiments on chemical pattern formation
N80-13109
A thermogravimetric system for investigating gas-metal reactions at elevated temperatures
[AD-A073412] N80-13194
Studies of ionization processes --- laser applications for study of chemical energy and reaction kinetics in molecular ions
[AD-A073823] N80-13195
Thermal stability and decomposition kinetics of amorphous hydrogenated films
[CONF-790442-12] N80-13199
Photochemistry of dinitrogen pentoxide
[LBL-9034] N80-13206
Coal liquefaction short residence time process research
[SAND-79-1400] N80-13272
Coalification reactions under pressure
[MLM-2556[TR]] N80-13284
Kinetics of a CO_2 nuclear pumped laser
N80-13449
REACTOR MATERIALS
Damage of metal surfaces by a hot, dense deuterium plasma
N80-13212
REACTOR SAFETY
Experimental study of hydrogen jet ignition and jet extinguishment --- breeder reactor safety
[HEDL-TME-78-80] N80-13198
Fractographic study of a thick wall pressure vessel failure --- safety and reliability of nuclear pressure vessels
[CONF-790730-2] N80-13522
REACTOR TECHNOLOGY
Coal liquefaction short residence time process research
[SAND-79-1400] N80-13272
Scaling studies of beam-heated tokamaks
[ORNL/TM-6584] N80-13939
READ-ONLY MEMORY DEVICES
Rom-based sequential circuits: An alternative approach to conventional logic design
[SAND-78-2333] N80-13370
REAL TIME OPERATION
Synthesis of a control model for a liquid nitrogen cooled, closed circuit, cryogenic nitrogen wind tunnel and its validation
[NASA-CR-162508] N80-13058
The automobile driving simulator for anthropogenic research
[FB-41] N80-13779
Evaluation of a simulation frame program for the EAI Pacer 600 hybrid-computer
[DFVLR-MITT-79-01] N80-13794
Real-time emulation of hardware
N80-13802
Using intelligent graphics terminals in real-time processing
[AD-A073760] N80-13823
RECEIVERS
Novel ceramic receiver for solar Brayton systems
[COO-4878-3] N80-13694
RECIPROCAL THEOREMS
Receiving properties of the small annular slot antenna
[SAND-78-7067] N80-13342
RECRYSTALLIZATION
Characterization and properties of controlled nucleation thermochemical deposited [CNTD] silicon carbide
[NASA-TM-79277] N80-13254
RECTANGULAR GUIDES
On the design and realization of two dimensional digital filters
N80-13351
RECTENNAS
Solar power satellite system definition study. Volume 7, phase 1: SPS and rectenna systems analyses
[NASA-CR-160376] N80-13145
RECURSIVE FUNCTIONS
An empirical power study of recursive outlier detection procedures
N80-13854
A new method for the design of recursive digital filters and its fields of application
[ESA-TT-530-REV] N80-13930
REDUCED GRAVITY
Convective processes at low gravity
N80-13073
Experiment SYRENA 1, 2, 3: Space processing of CdHgTe, CdHgTe and PbSeTe
N80-13076
Influence of the space environment on some materials processing phenomena
N80-13077
The preparation and stability of metallic emulsions in a microgravity environment: An experiment for the First Spacelab Payload [FSLP]
N80-13081
Brazing under microgravity: TEXUS 2 experiment
N80-13082
Fabrication of composite materials under low gravity [experiment ES 310 of the First Spacelab Payload [FSLP]]
N80-13084
Steady and oscillatory Marangoni convection in floating zones under 1g
N80-13111
Migration of gas bubbles under various force fields in a microgravitational environment
N80-13113
An experimental method for determination of mass transport in liquid metals to be applied under microgravity
N80-13120
Overview of the future of the TEXUS program
N80-13123
REENTRY PHYSICS
Analysis of reentry vehicle trajectory reconstruction and parameter identification
[SAND-79-1365C] N80-13136
REENTRY TRAJECTORIES
Analysis of reentry vehicle trajectory reconstruction and parameter identification
[SAND-79-1365C] N80-13136
REENTRY VEHICLES
Analysis of reentry vehicle trajectory reconstruction and parameter identification
[SAND-79-1365C] N80-13136
REFLECTANCE
Optical reflectance studies of adsorption and reaction on platinum
N80-13183
Metal silver-liquid interface: Oxide properties from reflectance and scattered light spectroscopy
[COO-4381-7] N80-13235
Photopolarimetry of scattering surfaces and their interpretation by computer model
[NASA-CR-162514] N80-14002
REFRACTORY METALS
Fatigue and delayed failure of refractory metals --- canadium and niobium hydride alloys
[COO-3459-14] N80-13233
REGENERATION [ENGINEERING]
Regenerative process for desulfurization of high temperature combustion and fuel gases
[BNL-50944] N80-13277
An investigation of the efficiency of regenerative blowers and pumps
N80-13463
REGENERATIVE FUEL CELLS
Hydrogen-halogen energy storage system
[BNL-50924] N80-13632
REGIONAL PLANNING
Remote sensing applied to urban and regional planning. A bibliography with abstracts
[NTIS/PS-79/0843/7] N80-13615
REGRESSION ANALYSIS
Maximum likelihood estimation of the autoregressive coefficients and moving average covariances of vector autoregressive moving average models
[AD-A073788] N80-13845
A density-quantile function approach to choosing order statistics for the estimation of location and scale parameters
[AD-A073270] N80-13866
REGULATIONS
Energy system in the Far West: Impacts of the National Energy Act of 1978
[UCRL-52754] N80-13638

REINFORCED PLASTICS
Evaluation of polar and non-polar plastics compounded with thermomechanical wood fibers
N80-13247

REINFORCING FIBERS
Improved fiber retention by the use of fillers in graphite fiber/resin matrix composites
[NASA-TM-79288] N80-13171
Identification of the elastic constants for composites using modal analysis
[SAND-79-0527C] N80-13176
Deformation and failure information from composite materials via acoustic emission
[UCRL-81272] N80-13177
Curing and flow of thermosetting resins for composite material pultrusion
N80-13244
Evaluation of polar and non-polar plastics compounded with thermomechanical wood fibers
N80-13247

RELATIVISTIC ELECTRON BEAMS
Design and analysis of transient high voltage electrical devices: Ozone production in fast pulsed dielectric barrier discharges in oxygen and modeling of an intense relativistic electron beam source
N80-13890
Relativistic electron bean energy deposition in thin gold and aluminum targets
[SAND-78-2026] N80-13901

RELATIVITY
The construction of spacetimes from initial data
N80-13870

RELIABILITY
Bayesian parameter and reliability estimation for a multivariate exponential distribution
N80-13862

RELIABILITY ANALYSIS
Modified aerospace reliability and quality assurance method for wind turbines
[NASA-TM-79284] N80-13490
Extensions of a simple model with applications in reliability, extinction of species, inventory depletion and urn sampling
[AD-A073814] N80-13492
MERADCOM/OSU hydraulic system reliability program --- reliability analysis of hydraulic pumps and valves
[AD-A073789] N80-13493
Summary of technical progress, investigation of software models
[AD-A073639] N80-13819
Preliminary reference manual for the Green programming language: A language designed in accordance with the Ironman requirements
[AD-A073661] N80-13820
Reliable microprogramming
[AD-A073454] N80-13826

RELIABILITY ENGINEERING
Stochastic modelling for reliability and other performance measures of software systems with applications
N80-13486
Reliability and maintainability management manual --- quality control and reliability engineering in management planning for project management
[AD-A073299] N80-13491

REMOTE CONTROL
Remotely piloted vehicles. Citations from the International Aerospace Abstracts data base
[NTIS/PS-79/0875/9] N80-13040

REMOTE SENSORS
A intrusive slotted cylinder antenna array for subsurface moisture profiling
N80-13323
Earth resources. A continuing bibliography with indexes, issue 23
[NASA-SP-7041[23]] N80-13585
The Geoscientific Airborne Remote Sensing Program
[BMFT-FB-W-78-31] N80-13608
SPOT, French preoperational remote sensing satellite system
N80-13610
Remote sensing applied to geology and mineralogy. A bibliography with abstracts
[NTIS/PS-79/0844/5] N80-13612
Remote sensing applied to geology. Citations from the International Aerospace Abstracts data base
[NTIS/PS-79/0822/1] N80-13613
Remote sensing applied to environmental pollution detection and management. A bibliography with abstracts
[NTIS/PS-79/0842/9] N80-13614
Remote sensing applied to urban and regional planning. A bibliography with abstracts
[NTIS/PS-79/0843/7] N80-13615
Remote systems requirements of the High Yield Lithium Injection Fusion Energy [HYLIFE] converter concept --- systems engineering of remote sensors for inspection of fusion reactor electric power plant
[UCRL-81309] N80-13908

REMOTELY PILOTED VEHICLES
Remotely piloted vehicles. Citations from the International Aerospace Abstracts data base
[NTIS/PS-79/0875/9] N80-13040

RESEARCH AND DEVELOPMENT
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-33] N80-13287
Basic research needs in fluid mechanics
[BNL-50995] N80-13418
Derivation of a quantitative model to assess the performance of research and development organizations
N80-13981

RESEARCH MANAGEMENT
Characteristic parameters in combustion processes and their accessibility to current and future diagnostics
[ORO-5773-T1] N80-13197
Underground coal conversion. Program description
[DOE/ET-0100] N80-13293
Review of supporting research at Oak Ridge National Laboratory for underground coal conversion
[CONF-790630-9] N80-13295
Compilation of data relevant to nuclear pumped lasers, volume 5
[AD-A073575] N80-13457
Time-dependent fracture of materials at elevated temperature --- conference
[CONF-790236] N80-13520
Solar heating and cooling research projects: A summary
[EPRI-ER-1095-SR] N80-13703

RESERVOIRS
Tidal pressure response as a reservoir engineering tool
[UCRL-83012] N80-13647

RESIDUES
Gasification of residual materials from coal liquefaction
[FE-2247-22] N80-13289

RESISTANCE HEATING
The effects of Joule heat on turbulent dispersion of temperature in high Reynolds number flow
N80-13396

RESONANCE SCATTERING
Resonant Raman scattering from electron-phonon coupled modes in 3-V semiconductors
N80-13356

RESONANT FREQUENCIES
Reduction methods for problems of vibration of orthotropic plates. Part 1: Exact methods
N80-13309
Reduction methods for problems of vibration of orthotropic plates. Part 2: Generalized reduction method for generally orthotropic plates with arbitrary shape
N80-13501
Phase measurements of fast wave toroidal eigenmodes --- resonant frequencies
N80-13931

RESOURCE ALLOCATION
Energy policy and decision analysis; new concepts and mechanisms
[LA-7909-MS] N80-13634

RESOURCES MANAGEMENT
National energy policy and state coastal programs: A critique of current efforts to balance environmental protection and energy production along the coast
[SAN-0034/263-1] N80-13643
Federal Laboratory Consortium for Technology Transfer. Far West Region Local Government Assistance Task Force
[UCID-18037-79-2] N80-13990

RESPONSE TIME [COMPUTERS]
Distributed database organization for optimal computer network response time
N80-13828

RESUSCITATION
Resuscitation from hypothermia: A literature review
[AD-A069093] N80-13764

RETINA
Effects of ionizing radiation on the light sensing elements of the retina
[LBL-5683] N80-13767

RETRIEVAL
Queues and stores with nonhomogeneous input
N80-13830

RETROROCKET ENGINES
System definition study for a German contribution to the Jupiter Orbiter Probe project
[BMFT-FB-W-78-24] N80-13128

REVOLVING
Finite element linear models for symmetrically loaded thin shells of revolution
[LA-UR-79-1321] N80-13515

REYNOLDS NUMBER
Amplification of Reynolds number dependent processes by wave distortion --- liquid fuel combustor stability
[NASA-CR-159732] N80-13193
The effects of Joule heat on turbulent dispersion of temperature in high Reynolds number flow
N80-13396

RICCATI EQUATION
Duality theory, stochastic realization and invariant directions for linear discrete-time stochastic systems
N80-13858

RIGID MOUNTING
Mounting procedure for high quality optical systems
[BMFT-FB-T-78-19] N80-13929

RIGIDITY
Loss of lattice rigidity in austenite
[AD-A073280] N80-13221

RIVER BASINS
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597

ROCKET EXHAUST
Effects of rocket exhaust products in the thermosphere and ionosphere
[LA-7926-MS] N80-13167

ROCKET FLIGHT
A numerical solution for rocket ascent trajectory
[AD-A073346] N80-13166

ROCKET PROPELLANTS
Design and evaluation of high performance rocket engine injectors for use with hydrocarbon fuels
[NASA-TM-79319] N80-13163

ROCKET VEHICLES
Preparatory studies for an experiment in directional solidification of immiscible Al-In alloys on board a rocket vehicle
N80-13100
Determination and geophysical intepretation of the orbit of China 2 rocket [1971-18B]
[RAE-TR-78107] N80-13137

ROCKS
The propagation of VLF waves through the interior of the Earth
[DRIC-TRANS-5572] N80-13345

ROLL
Star tracker error analysis: Roll-to-pitch nonorthogonality
[NASA-TM-80835] N80-13134

ROLLER BEARINGS
Development of mainshaft high-speed cylindrical roller bearings for gas turbine engines
[AD-A073381] N80-13475

ROLLING MOMENTS
Parametric study of the Orbiter rollout using an approximate solution
[NASA-TM-80837] N80-13148

ROTARY STABILITY
Stability problems on rotor systems --- rotary stability and lateral stability phenomena due to self induced vibration
N80-13301
Recent spin test of two composite wagon wheel flywheels
[SAND-79-1669C] N80-13640

ROTARY WINGS
Analysis and correlation with theory of rotor lift-limit test data
[NASA-CR-159139] N80-13028

ROTATING BODIES
Investigations on unsteady pressure distribution measurements in rotating systems
[ESA-TT-503-REV] N80-13059

ROTATING DISKS
Theoretical and experimental studies of periodic currents and potentials in electroplating and in fast kinetics on a rotating disk electrode
N80-13350

ROTATING FLUIDS
The scattering of sound by a region of fluid in solid body rotation at low Mach number
[RAE-TR-78100] N80-13886

ROTATING LIQUIDS
Flow phenomena in rotating floating zones with and without Marangoni convection
N80-13104
Marangoni convection in a liquid layer subjected to rotation about a transverse axis
N80-13115

ROTOR BLADES [TURBOMACHINERY]
Flutter spectral measurements using stationary pressure transducers
[NASA-TM-79293] N80-13046

ROTOR LIFT
Analysis and correlation with theory of rotor lift-limit test data
[NASA-CR-159139] N80-13028

ROTORS
An analytical investigation of three-dimensional vibration in gear-coupled rotor systems
N80-13471
Statistical techniques for automating the detection of anomalous performance in rotating machinery
[CONF-790435-2] N80-13481
Dynamic analysis of complex multi-level flexible rotor systems --- vibration calculations
N80-13509
Wind energy innovative systems
[SERI/PR-13-054] N80-13674

RUN TIME [COMPUTERS]
The analysis of processor-time trade-off opportunities in a reconfigurable multi-processor system
N80-13783

RUNGE-KUTTA METHOD
Analysis of numerical stability and amplification matrices: Fourth-order Runge-Kutta methods
[NASA-TM-80836] N80-13841

RUNWAY LIGHTS
Installation criteria for the Approach Lighting System Improvement Program [ALSIP]
[AD-A070076] N80-13057
RURAL LAND USE
A report on field work in the city of Paragominas [PA]
[E80-10001] N80-13587

S

SAFETY DEVICES
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7952-PR] N80-13911
SAFETY FACTORS
Critical review and assessment of environmental and safety problems in hydrogen energy systems
[LA-7820-PR] N80-13690
SAFETY MANAGEMENT
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7952-PR] N80-13911
SALTON SEA [CA]
Tidal pressure response as a reservoir engineering tool
[UCRL-83012] N80-13647
SALYUT SPACE STATION
Investigation of the structure of Te-Se solid solutions obtained under different gravity conditions on board the Salyut 6 station, in a centrifuge N80-13074
Experiment MORAVA on board Salyut 6 --- on the crystallization of eutectic compounds N80-13096
SANDS
Electronmicroscopic study of sand erosion processes in metals
[AD-A073497] N80-13220
SANDWICH STRUCTURES
Weight minimization of sandwich type solar collector panels
[SAND-78-2305C] N80-13710
SATELLITE ATTITUDE CONTROL
Two-impulse reorientation of asymmetric spacecraft
[NASA-TP-1554] N80-13135
The Miranda star sensor experiment
[RAE-TR-78112] N80-13146
Flight Technology Improvement --- spaceborne optical radiometric instruments, attitude control, and electromechanical and power subsystems
[NASA-CP-2101] N80-13152
Summary of the Flight Technology Improvement Workshop --- spaceborne optical radiometric instruments, attitude control, and electromechanical and power subsystems N80-13153
Report of the Attitude Control and Attitude Determination Panel --- spacecraft instrumentation technology N80-13157
SATELLITE DESIGN
Concept study of a shuttle-satellite in consideration of European satellite developments and launcher systems for the 1980's
[BMFT-FB-W-78-25] N80-13129
SATELLITE NAVIGATION SYSTEMS
Further development of the Radio-ANA-System
[BMFT-FB-M-78-05] N80-13021
SATELLITE NETWORKS
Satellite Doppler positioning in strengthening geodetic networks N80-13015
SATELLITE OBSERVATION
First observations of a heated plasma component in the plasma mantle N80-13538
Observations of ion and electron distributions during the July 29 and July 30, 1977 storm period N80-13540
Multiple-satellite observations of large scale trapping boundary motions N80-13549
Ionospheric convection at high latitudes N80-13551
STARE ionospheric electron flows during the August 28, 1978 GEOS-2 magnetopause crossing N80-13552
Space Observations for water resources: A potential to be developed N80-13609
SPOT, French preoperational remote sensing satellite system N80-13610
SATELLITE PERTURBATION
Satellite contributions to tidal studies
[TUM-MITT-147] N80-13583
SATELLITE SOLAR ENERGY CONVERSION
Solar power satellite system definition study. Volume 1, phase 1: Executive summary
[NASA-CR-160370] N80-13139
Solar power satellite system definition study. Volume 2, phase 1: Systems analyses tradeoffs.
[NASA-CR-160371] N80-13140
Solar power satellite system definition study. Volume 3: Reference system description, phase 1
[NASA-CR-160372] N80-13141
Solar power satellite system definition study. Volume 5, phase 1: Executive summary
[NASA-CR-160374] N80-13143
SATELLITE TRANSMISSION
Error performance of differentially coherent detection of binary DPSK data transmission on the hard-limiting satellite channel
[AD-A073377] N80-13337
SATELLITE-BORNE INSTRUMENTS
Report of Optical Radiometric Instruments and Calibration Panel --- spaceborne instrumentation technology N80-13154
SATELLITE-BORNE PHOTOGRAPHY
The Geoscientific Airborne Remote Sensing Program
[BMFT-FB-W-78-31] N80-13608
SCALE [RATIO]
Invariant tests for scale parameters under elliptical symmetry N80-13855
SCANNING
Scanning reference electrode techniques in localized corrosion
[BNL-26094] N80-13238
SCATTERING
deHass-vanAlphen measurements of spin resolved scattering in the Cu[Mn] magnetic impurity system N80-13955
SCENE ANALYSIS
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study --- Kansas
[E80-10012] N80-13591
SEA GRASSES
Photosynthetic carbon reduction by seagrasses exposed to ultraviolet A radiation
[NASA-CR-160397] N80-13757
SEA STATES
A study of possible sea state information in the sample and hold gate statistics for the GEOS-3 satellite altimeter
[NASA-CR-156858] N80-13753
SEA WATER
The fate of dissolved aluminum within the oceans N80-13586
SEALERS
Development of alternate silicone potting compounds. Volume 5: Development of substitute no. 1 for Dow Corning's aerospace sealant DC93-122
[UCRL-52434-VOL-5] N80-13374
SEALS [STOPPERS]
Feasibility of SiC composite structures for 1644 deg gas turbine seal applications
[NASA-CR-159597] N80-13474
Novel ceramic receiver for solar Brayton systems
[COO-4878-3] N80-13694
SEARCH PROFILES
Performance measurement and analysis of certain search algorithms N80-13803
SEATS
Aerodynamic characteristics of wheelchairs --- Langley V/STOL wind tunnel tests for human factors engineering
[NASA-TM-80191] N80-12999
Evaluation of seating and restraint systems conducted during fiscal year 1978
[AD-A074881] N80-13014
Fire-resistant materials for aircraft passenger seat construction
[NASA-TM-78617] N80-13255
SEDIMENTS
The analysis of sediment samples for hydrocarbons
[AD-A073822] N80-13754
SEISMOLOGY
Development of in situ marine seismic and geotechnical instrumentation systems
[SAND-79-0868C] N80-13431
SELENIDES
Resistivity and hall coefficient measurements of iron doped niobium diselenide crystals N80-13951
SELENIUM
Investigation of the structure of Te-Se solid solutions obtained under different gravity conditions on board the Salyut 6 station, in a centrifuge N80-13074
SELF ADAPTIVE CONTROL SYSTEMS
The development of active control and its application to flutter suppressors --- wind tunnel test results
[AAAF-NT-79-02] N80-13056
SELF INDUCED VIBRATION
Stability problems on rotor systems --- rotary stability and lateral stability phenomena due to self induced vibration N80-13301
SEMANTICS
Building efficient pass-oriented attribute grammar evaluators N80-13796
SEMICONDUCTOR DEVICES
IVFOR: A user oriented program characterizing the current-voltage properties of a two terminal device
[SAND-79-0972] N80-13373
SEMICONDUCTORS [MATERIALS]
Experiment SYRENA 1, 2, 3: Space processing of CdHgTe, CdHgTe and PbSeTe N80-13076
Some 3-5-semiconductor crystals grown by the traveling-heater method N80-13117
Resonant Raman scattering from electron-phonon coupled modes in 3-V semiconductors N80-13356
Materials for solar thermal conversion
[COO-4557-1] N80-13670
Transient phenomena in electron transport in semiconductors
[AD-A073009] N80-13966
Epitaxy at reduced temperatures
[BMFT-FB-T-78-52] N80-13980
SENSORY FEEDBACK
A comparison of control simulators having force inputs and displacement feedback. Applications to the manual control of underwater vehicles
[FB-38] N80-13777
SEPARATED FLOW
Investigation of flow characteristics over missile bodies at supersonic speeds
[NASA-TP-1579] N80-13001
SEPARATORS
Development and evaluation of materials for high temperature lithium/sulfur rechargeable batteries
[DOE/TIC-10098] N80-13682
Development of porous sintered-ceramic separators for application in a Li-Al/LiCl-KCl/FeS battery
[CONF-790526-2] N80-13683
SEQUENCING
Two-dimensional sequential algorithms for image restoration and enhancement N80-13354
SEQUENTIAL CONTROL
Rom-based sequential circuits: An alternative approach to conventional logic design
[SAND-78-2333] N80-13370
SERVICE MODULES
A service system for material sciences experiments on Space Shuttle N80-13089
SERVOMOTORS
Investigation of high frequency oscillations in the OV102 elevon actuation subsystems using continuous system modeling program simulation
[NASA-CR-160407] N80-13151
SEWAGE TREATMENT
Characterization of solid-waste conversion and cogeneration systems
[LBL-7883] N80-13648
SHALE OIL
Environmental analysis of synthetic liquid fuels --- shale oil, coal liquefaction, and biomass production of ethanol
[DOE/EV-0044] N80-13279
Critique of the meteorological and air quality baseline monitoring program for the prototype oil shale leaseholds. Part A: Comments on the approach taken and recommendations for continuing program. Part B: Comments on the data acquisition and management
[DOE/EV-70031/4-PT-A/B] N80-13723
SHALES
A report on field work in the city of Paragominas [PA]
[E80-10001] N80-13587
Devonian paleocurrents of the Applachian basin --- gas production
[METC/CR-79/22] N80-13735
SHOCK LAYERS
Three-dimensional viscous hypersonic flows over general bodies using shock-layer and parabolized Navier-Stokes equations N80-12993
SHOCK MEASURING INSTRUMENTS
Notes on the transient responses and errors of shock accelerometers with second-order filters
[RAE-TM-IT-179] N80-13435
The shock and vibration digest, volume 11, number 6
[AD-A070464/3] N80-13499
SHOCK RESISTANCE
Structural optimization under shock and vibration environment N80-13496
SHOCK TUNNELS
A theoretical study of the supercritical aerofoil NLR 7301, and comparison with experiments --- shock tunnel tests
[RAE-TR-78119] N80-13010
SHOCK WAVES
Shock-induced electrical switching in polymeric films
[CONF-790540-11] N80-13264
Fast opening switches carrying multimegampere currents and their application to high velocity shock waves in xenon
[UCRL-82134] N80-13385
Shock compression of liquid methane and the principle of corresponding states
[UCRL-82127] N80-13410
Contributions of shock-wave physics to high-pressure standards --- high pressure measurements using shock waves
[LA-UR-79-2039] N80-13875

SHORT TAKEOFF AIRCRAFT
An exploratory investigation of the STOL landing maneuver
[NASA-CR-3191] N80-12996
Flight test of navigation and guidance sensor errors measured on STOL approaches
[NASA-TM-81154] N80-13041
Experimental study of acoustic loads on an upper-surface-blown STOL airplane configuration --- Langley full-scale wind tunnel tests
[NASA-TP-1577] N80-13879
Assessment at full scale of exhaust nozzle to wing size on STOL-OTW acoustic characteristics
[NASA-TM-79279] N80-13881
SHRINKAGE
Thermal shrinkage mechanisms of poly[ethylene terephthalate] fibers
N80-13246
SIGNAL ANALYZERS
GaAs waveguide detector array for an IOC spectrum analyzer
[AD-A073552] N80-13924
SIGNAL DETECTION
Digital detection by digital signal processing techniques --- detection performance in presence of noise introduced by the analog to digital converter
N80-13331
Auditory detection of bandpass-filtered impulses under various conditions of masking
N80-13877
SIGNAL DISTORTION
An investigation of the effects of analog and digital systems on signal fidelity
N80-13327
SIGNAL PROCESSING
Digital detection by digital signal processing techniques --- detection performance in presence of noise introduced by the analog to digital converter
N80-13331
Parameter estimation narrow-band processes with arrays
N80-13332
SIGNAL RECEPTION
Receiving properties of the small annular slot antenna
[SAND-78-7067] N80-13342
SIGNAL TRANSMISSION
An investigation of the effects of analog and digital systems on signal fidelity
N80-13327
SIGNATURE ANALYSIS
Statistical techniques for automating the detection of anomalous performance in rotating machinery
[CONF-790435-2] N80-13481
Earth observations division Earth resources data analysis capabilities
[E80-10013] N80-13592
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
SILICA GEL
Application of synthetic molecular sieve zeolites and silica gel toward the separation of sulfur dioxide from combustion gases
N80-13180
SILICATES
Structures, spectra and related properties of titanium-, zirconium-, and hafnium-doped vitreous silica
N80-13245
SILICON
Preparatory experiments for the growth of silicon single crystals in the mirror heating facility of Spacelab
N80-13079
Solar power satellite system definition study. Volume 4: Silicon solar cell annealing test, phase 1
[NASA-CR-160373] N80-13142
Lifetime control in silicon through focused laser beam damage
[AD-A072909] N80-13455
Development of methods of producing large areas of silicon sheet by the slicing of silicon ingots using inside diameter [I.D.] saws
[NASA-CR-162520] N80-13621
Low cost solar cells based on amorphous silicon electrodeposited from organic solvents
[SAN-0113-T3] N80-13678
Dual photoconductivity effects induced by the intersubband transitions in n-type silicon inversion layers
N80-13962
SILICON CARBIDES
Characterization and properties of controlled nucleation thermochemical deposited [CNTD] silicon carbide
[NASA-TM-79277] N80-13254
Feasibility of SiC composite structures for 1644 deg gas turbine seal applications
[NASA-CR-159597] N80-13474
Fatigue and creep behavior of Si3N4 and SiC for gas turbine applications
[EPRI-FP-1060] N80-13483
Microstructure, sintering and strength of polycrystalline SiC
[LBL-9257] N80-13976
SILICON CONTROLLED RECTIFIERS
An explicit state model of a synchronous machine - transformer - SCR bridge unit
N80-13357
SILICON FILMS
Thermal stability and decomposition kinetics of amorphous hydrogenated films
[CONF-790442-12] N80-13199
Epitaxy at reduced temperatures
[BMFT-FB-T-78-52] N80-13980
SILICON NITRIDES
Particle impact damage in silicon nitride, part 3
[AD-A073570] N80-13172
Development of high temperature resistant, incorrodible, non-metallic ceramic materials: The use of silicon nitride for heat exchangers in gas turbine applications
[BMFT-FB-T-78-51] N80-13266
Fatigue and creep behavior of Si3N4 and SiC for gas turbine applications
[EPRI-FP-1060] N80-13483
SILICON POLYMERS
Improved bondability to RTV silicone elastomer using rf-activated gas
[BDX-613-2157] N80-13260
SILICONES
Evaluation of cleaners for photovoltaic modules exposed in an outdoor environment
[NASA-TM-79248] N80-13317
Development of alternate silicone potting compounds. Volume 5: Development of substitute no. 1 for Dow Corning's aerospace sealant DC93-122
[UCRL-52434-VOL-5] N80-13374
SILVER ALLOYS
The elastic modulus and diffusion coefficents of silver-palladium composition modulated foils
N80-13216
Co-sputtering of aluminum-silver alloy mirrors for solar reflectors
[RFP-2896] N80-13626
SILVER OXIDES
Metal silver-liquid interface: Oxide properties from reflectance and scattered light spectroscopy
[COO-4381-7] N80-13235
SIM
The fluid physics module: A contribution to materials science and physics in space
N80-13087
Process chamber: Payload element of the German microgravity mission D 1
N80-13090
Functional performance of the isothermal heating facility for the material science double rack
N80-13091
Experiment modules and facilities in TEXUS 1 and 2
N80-13092
A container for conditioning space experiments
N80-13093
Experiment performance under zero-G using Small Self-Contained Payloads [SSCP] and other automatic equipment
N80-13122
Feasibility study for Spacelab user program: Propagation of electromagnetic waves
[BMFT-FB-W-78-10] N80-13344
SINE WAVES
Estimation of the RMS value of summed sinusoids and the application to acoustic noise measurement in shallow water
[AMTE[N]-TM-78413] N80-13885
SINGLE CRYSTALS
Structural and physical characteristics of InSb single crystals grown under near-zero gravity conditions
N80-13071
Preparatory experiments for the growth of silicon single crystals in the mirror heating facility of Spacelab
N80-13079
Some 3-5-semiconductor crystals grown by the traveling-heater method
N80-13117
Thermal faceting behavior of single crystal aluminum oxide
N80-13960
Effect of electron irradiation on the strength of niobium single crystals
N80-13961
Properties of single crystal beta-aluminas
[CONF-790538-9] N80-13977
Characterization of heat treatment induced changes in Li-NA beta-alumina single crystals
[CONF-790538-6] N80-13978
SINGULAR INTEGRAL EQUATIONS
Evaluation of integrals whose integrands are oscillatory and singular
N80-13838
SINTERING
Development of porous sintered-ceramic separators for application in a Li-Al/LiCl-KCl/FeS battery
[CONF-790526-2] N80-13683
Microstructure, sintering and strength of polycrystalline SiC
[LBL-9257] N80-13976
SITES
Evaluation of the proposed WIPP site in Southeast New Mexico --- waste isolation pilot plant
[SAND-79-1113C] N80-13909
SIZE [DIMENSIONS]
Section size effects on toughness of various cast steels
N80-13210
SKID LANDINGS
Friction characteristic of steel skids equipped with skegs on a lakebed surface --- landing gear
[NASA-TM-81347] N80-13027
SKIN [STRUCTURAL MEMBER]
Skin technology --- and the improvement of materials microstructures
N80-13083
SKYLAB PROGRAM
Earth resources. A continuing bibliography with indexes, issue 23
[NASA-SP-7041[23]] N80-13585
Analysis of metabolic energy utilization in the Skylab astronauts
[NASA-CR-160402] N80-13770
Skylab water balance error analysis
[NASA-CR-160403] N80-13771
SKYLARK ROCKET VEHICLE
Experiment modules and facilities in TEXUS 1 and 2
N80-13092
The influence of microgravity on the structure of Bi-Zn immiscible alloys
N80-13098
Stability of multicomponent mixtures under microgravity conditions
N80-13099
Fundamental experiments on interfacial convection; Project TEXUS 1 and 2
N80-13102
Skylark sounding rocket facilities for materials science experiments
N80-13121
Overview of the future of the TEXUS program
N80-13123
SLENDER WINGS
Some measurements of buffeting on an aeroelastic model of a slender wing aircraft
[RAE-TM-STRUCT-942] N80-13055
SLICING
Development of methods of producing large areas of silicon sheet by the slicing of silicon ingots using inside diameter [I.D.] saws
[NASA-CR-162520] N80-13621
SLOT ANTENNAS
Receiving properties of the small annular slot antenna
[SAND-78-7067] N80-13342
SMALL SCIENTIFIC SATELLITES
The Miranda star sensor experiment
[RAE-TR-78112] N80-13146
SMOKE
Lidar observations at 0.7-micrometers and 10.6-micrometers wavelengths during dusty infrared test I
[DIRT I]
[AD-A073330] N80-13340
SNOW
Comparison of centrifuge and freezing calorimeter methods for measuring free water in snow
[NASA-CR-162504] N80-13319
SNOW COVER
Development of an airborne gamma radiation system for snow surveys
[EGG-1183-1679] N80-13606
Snow mapping from space platforms
N80-13611
SODIUM
Experimental study of hydrogen jet ignition and jet extinguishment --- breeder reactor safety
[HEDL-TME-78-80] N80-13198
Characterization of heat treatment induced changes in Li-NA beta-alumina single crystals
[CONF-790538-6] N80-13978
SODIUM ALLOYS
Domain and surface structures of sodium tungsten bronzes, Na/sub x/WO3 [0.4 x 1]
[ANL-78-63] N80-13237
SODIUM COMPOUNDS
Properties of single crystal beta-aluminas
[CONF-790538-9] N80-13977
SOIL EROSION
A report on field work in the city of Paragominas [PA]
[E80-10001] N80-13587
SOIL MAPPING
Remote sensing applied to geology and mineralogy. A bibliography with abstracts
[NTIS/PS-79/0844/5] N80-13612
SOIL MOISTURE
A intrusive slotted cylinder antenna array for subsurface moisture profiling
N80-13323
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for

1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
The estimation of soil moisture content and actual evapotranspiration using thermal infra-red remote sensing --- Buckinghamshire, England
[E80-10021] N80-13599
Beauce TELLUS project --- France
[E80-10024] N80-13600
Estimation of regional evapotranspiration and soil moisture conditions using remotely sensed crop surface temperatures
[REPT-1003] N80-13616

SOLAR ACTIVITY EFFECTS
Two states of the solar wind at the time of minimum solar activity. Part 1: Boundary layers between fast and slow streams
N80-14013
Two states of the solar wind at the time of minimum solar activity. Part 2: Radial gradients of plasma parameters in fast and slow streams
N80-14014

SOLAR ARRAYS
Classification and technical review of dc-ac inverters for use in photovoltaic power systems
[COO-4094-25] N80-13377
Development of methods of producing large areas of silicon sheet by the slicing of silicon ingots using inside diameter [I.D.] saws
[NASA-CR-162520] N80-13621
PEP solar array definition study
[NASA-CR-160398] N80-13622
Photovoltaic systems. Program summary
[DOE/ET-0019/2] N80-13691
Photovoltaic transient analysis program user's guide. Volume 1: Executive summary
[SAND-78-7038-VOL-1] N80-13704

SOLAR CELLS
Solar power satellite system definition study. Volume 4: Silicon solar cell annealing test, phase 1
[NASA-CR-160373] N80-13142
Theoretical analysis of multi-cell, high efficiency broad spectral sensitivity solar cells
N80-13617
Novel concentrator photovoltaic converter system development
[SAND-79-7040] N80-13661
Low cost solar cells based on amorphous silicon electrodeposited from organic solvents
[SAN-0113-T3] N80-13678
Silicon concentrator solar cell manufacturing development
[SAND-79-7021] N80-13697

SOLAR COLLECTORS
Linear concentration solar collector in an air supported enclosure. Preliminary design study
[SAND-78-7022] N80-13644
Performance testing of the General Electric Engineering Prototype Collector
[SAND-79-0514] N80-13645
Evaluation of combined photovoltaic/thermal collectors
[COO-4577-8] N80-13665
Experimental and theoretical evaluation of a novel concentrating solar energy collection system
[SAND-79-1053C] N80-13671
Solar central receiver prototype heliostat CDRL item B.D., volume 1
[SAN-1605/7-VOL-1] N80-13700
Weight minimization of sandwich type solar collector panels
[SAND-78-2305C] N80-13710

SOLAR CORPUSCULAR RADIATION
Two states of the solar wind at the time of minimum solar activity. Part 1: Boundary layers between fast and slow streams
N80-14013
Two states of the solar wind at the time of minimum solar activity. Part 2: Radial gradients of plasma parameters in fast and slow streams
N80-14014

SOLAR ENERGY
Solar energy perspectives for public power
[SERI/TP-35-300] N80-13635
Energy planning with solar and conservations: Individual values and community choice
[LA-UR-79-1599] N80-13653
Trans-seasonal storage of solar energy: Innovative research program subtask --- underground storage
[COO-4546-3] N80-13672

SOLAR ENERGY ABSORBERS
Materials for solar thermal conversion
[COO-4557-1] N80-13670

SOLAR ENERGY CONVERSION
The water splitting light reaction of chlorophyll a dihydrate. Visible light solar energy conversion after the primary reaction in plant photosynthesis
N80-13188
Biological transformation of light energy into methane using an anaerobic filter
N80-13267
Solar thermal test facility heliostat development
[SAND-78-1177] N80-13642
Linear concentration solar collector in an air supported enclosure. Preliminary design study
[SAND-78-7022] N80-13644
Performance testing of the General Electric Engineering Prototype Collector
[SAND-79-0514] N80-13645
Review of the environment effects and benefits of selected solar energy technologies
[SERI/TP-53-114R] N80-13649
Design, construction, and operation of the solar assisted heat pump ground coupled storage experiments at Brookhaven National Laboratory
[BNL-25908] N80-13654
Solar thermal power systems
[DOE/ET-0078/T1] N80-13662
Technology development needs for high temperature process heat
[SERI/TR-35-047] N80-13669
Experimental and theoretical evaluation of a novel concentrating solar energy collection system
[SAND-79-1053C] N80-13671
Silicon concentrator solar cell manufacturing development
[SAND-79-7021] N80-13697
Interim structural design standard for solar energy applications, phases 1 and 2 --- boiler and pressure vessel code
[SAND-79-8183] N80-13698
Review of solar energy
[SERI/TR-54-066] N80-13699
Solar heating and cooling research projects: A summary
[EPRI-ER-1095-SR] N80-13703
Thin film problems and research in energy systems
[CONF-761168-SUMM] N80-13705
Industrial applications of advanced energy systems
[CONF-790602-54] N80-13708
Solar-climactic statistical study --- windpower utilization and solar energy conversion
[HCP/T4016-01/2] N80-13747

SOLAR GENERATORS
Test plan for the Mead 25-kW Photovoltaic Flexible Test Facility, 1979
[COO-4094-53] N80-13692
Sandia Laboratories operational experience with small heat engines in solar thermal power systems
[SAND-78-2163C] N80-13693
Materials testing for central receiver solar-thermal power systems
[TID-29443] N80-13695
Solar central receiver prototype heliostat CDRL item B.D., volume 1
[SAN-1605/7-VOL-1] N80-13700

SOLAR HEATING
Solar energy perspectives for public power
[SERI/TP-35-300] N80-13635
Novel ceramic receiver for solar Brayton systems
[COO-4878-3] N80-13694

SOLAR HOUSES
Solar cooling performance in CSU Solar House 3
[COO-2858-23] N80-13668

SOLAR POWER SATELLITES
Solar power satellite system definition study. Volume 1, phase 1: Executive summary
[NASA-CR-160370] N80-13139
Solar power satellite system definition study. Volume 2, phase 1: Systems analyses tradeoffs.
[NASA-CR-160371] N80-13140
Solar power satellite system definition study. Volume 3: Reference system description, phase 1
[NASA-CR-160372] N80-13141
Solar power satellite system definition study. Volume 4: Silicon solar cell annealing test, phase 1
[NASA-CR-160373] N80-13142
Solar power satellite system definition study. Volume 5, phase 1: Executive summary
[NASA-CR-160374] N80-13143
Solar power satellite system definition study. Volume 6, phase 1: Space construction and transportation
[NASA-CR-160375] N80-13144
Solar power satellite system definition study. Volume 7, phase 1: SPS and rectenna systems analyses
[NASA-CR-160376] N80-13145

SOLAR PROTONS
Some characteristics of proton velocity distributions in the solar wind as observed by the Helios solar probes
N80-14011

SOLAR RADIATION
Measurement and analysis of circumsolar radiation
[LBL-9214] N80-14015

SOLAR REFLECTORS
Co-sputtering of aluminum-silver alloy mirrors for solar reflectors
[RFP-2896] N80-13626

SOLAR TERRESTRIAL INTERACTIONS
Impulsive penetration of solar wind and its effects on the upper atmosphere
N80-13576

SOLAR TOTAL ENERGY SYSTEMS
Solar Total Energy Systems [STES] simulation program user's guide
[ORNL/SUB-7525/2] N80-13664
Sandia Laboratories operational experience with small heat engines in solar thermal power systems
[SAND-78-2163C] N80-13693

SOLAR WIND
The solar wind interaction with Venus
N80-13561
Rates of mass, momentum, and energy transfer at the magnetopause
N80-13571
Impulsive penetration of solar wind and its effects on the upper atmosphere
N80-13576
Contributions to the Fourth Solar Wind Conference --- conference, Burghausen, West Germany, 1978
[MPI-PAE/EXTRATERR-154] N80-14008
Ion sound turbulence in the solar wind
N80-14009
Initial results on solar wind alpha particle distributions as measured by Helios between 0.3 and 1 AU
N80-14010
Some characteristics of proton velocity distributions in the solar wind as observed by the Helios solar probes
N80-14011
Electron characteristics in the solar wind as deduced from Helios observations
N80-14012
Two states of the solar wind at the time of minimum solar activity. Part 1: Boundary layers between fast and slow streams
N80-14013
Two states of the solar wind at the time of minimum solar activity. Part 2: Radial gradients of plasma parameters in fast and slow streams
N80-14014

SOLENOIDS
Controlling magnetic field profiles
[SAND-79-0678] N80-13876

SOLID PHASES
Dispersed gaseous and solid phases in molten and solidified Cu
N80-13080

SOLID PROPELLANT IGNITION
Laser ignition of solid propellant formulations
[AD-A073316] N80-13270
Convective ignition of nitrocellulose based propellants in unsteady flow fields
[AD-A073546] N80-13271

SOLID PROPELLANTS
Experimental investigation of a solid fuel ramjet
[DFVLR-FB-78-27] N80-13485

SOLID SOLUTIONS
Investigation of the structure of Te-Se solid solutions obtained under different gravity conditions on board the Salyut 6 station, in a centrifuge
N80-13074
Specificity hydrogen and stress corrosion cracking in austenitic stainless steel
N80-13208
Creep behavior of precipitation and oxide dispersion strengthened superalloys
N80-13213

SOLID SURFACES
A universal model for the surface energy of solids
[AD-A073671] N80-13969

SOLID WASTES
Characterization of solid-waste conversion and cogeneration systems
[LBL-7883] N80-13648
A technical and economic evaluation of the project in Baltimore, Maryland, Volume 3 --- waste processing plant
[PB-297872/4] N80-13992
A technical and economic evaluation of the project in Baltimore, Maryland, volume 4 --- waste processing plant
[PB-297873/2] N80-13993

SOLIDIFICATION
Skin technology --- and the improvement of materials microstructures
N80-13083
The influence of microgravity on the structure of Bi-Zn immiscible alloys
N80-13098
Solidification of highly undercooled liquid metals and alloys
N80-13118
Application of rapid solidification techniques to aluminum alloys --- mathematical model
[AD-A073443] N80-13223

SOLIDS
Computer simulation of martensitic transformations in idealized systems
[LBL-9264] N80-13228

SOLUBILITY
Phase behavior and interfacial tension studies of surfactant systems
N80-13395

SOLVENTS
A study of ternary systems containing an acidic copolymer, a basic copolymer and a solvent
N80-13250

SOOT
Carbon particulate measurements in a diesel engine --- particle size distribution
[SAND-79-8210] N80-13725

SOUND PRESSURE
Experimental study of acoustic loads on an upper-surface-blown STOL airplane configuration --- Langley full-scale wind tunnel tests
[NASA-TP-1577] N80-13879

Advanced turbo-prop airplane interior noise reduction-source definition
[NASA-CR-159668] N80-13882
SOUND WAVES
Recent developments for the nonlinear distortion of non-dispersive acoustic waves. Part 1: Planar waves and the basic method
N80-13311
SOUNDING ROCKETS
Brazing under microgravity: TEXUS 2 experiment
N80-13082
Standardization of boom systems for sounding rocket experiments
[BMFT-FB-W-78-40] N80-13147
SOUTH DAKOTA
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
SPACE CHARGE
Generation and control of a slow space charge wave on a high current electron beam and its potential as a collective ion accelerator
N80-13900
SPACE ENVIRONMENT SIMULATION
Space environment and lunar surface processes
[NASA-CR-160363] N80-14003
SPACE HEATING [BUILDINGS]
Case study of the Brownell low energy requirement house
[BNL-50968] N80-13651
Multi-use geothermal energy system with augmentation for enhanced utilization. Non-electric application of geothermal energy in Susanville, California
[DOE/ET-248447/1] N80-13660
Community heating and cooling systems
[CONF-790446-6] N80-13706
SPACE MANUFACTURING
Space construction system analysis, final review. Part 1: Executive summary
[NASA-CR-160286] N80-13063
Space fabrication demonstration system. Composite beam cap fabricator development, phase 1 and 2
[NASA-CR-161348] N80-13068
Material sciences in space --- conference proceedings, Grenoble, Apr. 1979
[ESA-SP-142] N80-13069
Fabrication of composite materials under low gravity [experiment ES 310 of the First Spacelab Payload [FSLP]]
N80-13084
Fundamental and applied aspects of fluid physics under microgravity
N80-13103
Nonstationary analysis of the macrosegregation during the solidification in the space of the system Ge-Ga
N80-13107
The near-term potential of manufacturing in space
N80-13125
Solar power satellite system definition study. Volume 3: Reference system description, phase 1
[NASA-CR-160372] N80-13141
SPACE MISSIONS
Table of space vehicles: 1973 - 1978
[RAE-TM-SPACE-271] N80-13126
SPACE NAVIGATION
Feasibility study within the Spacelab utilization program: Common equipment, communication/navigation [COMNAV]
[BMFT-FB-W-78-36] N80-13130
SPACE PROCESSING
Material sciences in space --- conference proceedings, Grenoble, Apr. 1979
[ESA-SP-142] N80-13069
The multipurpose apparatus Crystal for process experiments in space
N80-13070
The influence of space conditions on directional crystallization of germanium and its properties
N80-13072
Experiment SYRENA 1, 2, 3: Space processing of CdHgTe, CdHgTe and PbSeTe
N80-13076
Influence of the space environment on some materials processing phenomena
N80-13077
Floating zone stability [exp. 1-ES-331] --- on board Spacelab
N80-13078
Brazing under microgravity: TEXUS 2 experiment
N80-13082
Positioning and mixing instrumentation employing electrostatic and acoustic principles
N80-13088
Engineering evaluation of existing space hardware for utilization in small self-contained payloads
N80-13094
Czechoslovakian preliminary program of material research in space
N80-13095
Experiment MORAVA on board Salyut 6 --- on the crystallization of eutectic compounds
N80-13096
Solidification of some eutectic alloys under microgravity conditions and at 1 g
N80-13097
The influence of microgravity on the structure of Bi-Zn immiscible alloys
N80-13098
Stability of multicomponent mixtures under microgravity conditions
N80-13099
Manufacturing of oxide glasses. Critical comment on proposals for melting and solidification experiments under zero-g conditions
[BMFT-FB-W-78-06] N80-13127
SPACE SHUTTLE ORBITER 102
Investigation of high frequency oscillations in the OV102 elevon actuation subsystems using continuous system modeling program simulation
[NASA-CR-160407] N80-13151
SPACE SHUTTLE ORBITERS
Concept study of a shuttle-satellite in consideration of European satellite developments and launcher systems for the 1980's
[BMFT-FB-W-78-25] N80-13129
Parametric study of the Orbiter rollout using an approximate solution
[NASA-TM-80837] N80-13148
Spacelab interface development test, volume 1, sections 1-6
[NASA-CR-160411] N80-13149
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160404] N80-13334
Effects of soft foam insulation impact --- on shuttle orbiter high temperature reusable surface insulation tiles
[NASA-CR-160400] N80-13472
PEP solar array definition study
[NASA-CR-160398] N80-13622
SPACE SHUTTLE PAYLOADS
A service system for material sciences experiments on Space Shuttle
N80-13089
Engineering evaluation of existing space hardware for utilization in small self-contained payloads
N80-13094
SPACE SHUTTLES
Office of Aeronautics and Space Technology preliminary requirements for space science and applications platform studies
[NASA-CR-161346] N80-13066
Orbital Transfer Vehicle [OTV] engine study. Phase A: Extension
[NASA-CR-161338] N80-13160
Shuttle GPS R/PA configuration and specification study
[NASA-CR-160396] N80-13360
Spacelab environment investigation by mass spectrometer
[BMFT-FB-W-78-02] N80-13774
SPACE SURVEILLANCE [SPACEBORNE]
Snow mapping from space platforms
N80-13611
SPACE TRANSPORTATION
Solar power satellite system definition study. Volume 3: Reference system description, phase 1
[NASA-CR-160372] N80-13141
Solar power satellite system definition study. Volume 6, phase 1: Space construction and transportation
[NASA-CR-160375] N80-13144
SPACE TRANSPORTATION SYSTEM
Guidelines for mission integration, a summary report
[NASA-CR-161347] N80-13067
Engineering evaluation of existing space hardware for utilization in small self-contained payloads
N80-13094
Design, fabrication and delivery of a high pressure LOX-methane injector
[NASA-CR-161343] N80-13162
PEP solar array definition study
[NASA-CR-160398] N80-13622
SPACE-TIME FUNCTIONS
The construction of spacetimes from initial data
N80-13870
SPACEBORNE EXPERIMENTS
Material sciences in space --- conference proceedings, Grenoble, Apr. 1979
[ESA-SP-142] N80-13069
The multipurpose apparatus Crystal for process experiments in space
N80-13070
Floating zone stability [exp. 1-ES-331] --- on board Spacelab
N80-13078
The preparation and stability of metallic emulsions in a microgravity environment: An experiment for the First Spacelab Payload [FSLP]
N80-13081
Brazing under microgravity: TEXUS 2 experiment
N80-13082
UHV-chamber: Theoretical background and facility development --- for dynamic contact experiments
N80-13086
A service system for material sciences experiments on Space Shuttle
N80-13089
Process chamber: Payload element of the German microgravity mission D 1
N80-13090
Experiment modules and facilities in TEXUS 1 and 2
N80-13092
A container for conditioning space experiments
N80-13093
Solidification of some eutectic alloys under microgravity conditions and at 1 g
N80-13097
The influence of microgravity on the structure of Bi-Zn immiscible alloys
N80-13098
Stability of multicomponent mixtures under microgravity conditions
N80-13099
Fundamental and applied aspects of fluid physics under microgravity
N80-13103
Space experiments on chemical pattern formation
N80-13109
Skylark sounding rocket facilities for materials science experiments
N80-13121
Experiment performance under zero-G using Small Self-Contained Payloads [SSCP] and other automatic equipment
N80-13122
Overview of the future of the TEXUS program
N80-13123
Problems posed by the integration of materials science experiments with spacecraft systems
N80-13124
Manufacturing of oxide glasses. Critical comment on proposals for melting and solidification experiments under zero-g conditions
[BMFT-FB-W-78-06] N80-13127
Examination and selection of suitable methods for measuring the thermal conductivity of liquids in Spacelab
[BMFT-FB-W-78-09] N80-13207
SPACECRAFT
Table of space vehicles: 1973 - 1978
[RAE-TM-SPACE-271] N80-13126
SPACECRAFT CONFIGURATIONS
Effects of relaxed static longitudinal stability on a single-stage-to-orbit vehicle design
[NASA-TP-1594] N80-13052
SPACECRAFT CONTAMINATION
Spacelab environment investigation by mass spectrometer
[BMFT-FB-W-78-02] N80-13774
SPACECRAFT CONTROL
Report of the Attitude Control and Attitude Determination Panel --- spacecraft instrumentation technology
N80-13157
SPACECRAFT DESIGN
Effects of relaxed static longitudinal stability on a single-stage-to-orbit vehicle design
[NASA-TP-1594] N80-13052
SPACECRAFT ENVIRONMENTS
A preliminary research plan for development of a photosynthetic link in a closed ecological life support system
[NASA-CR-160399] N80-13758
Spacelab environment investigation by mass spectrometer
[BMFT-FB-W-78-02] N80-13774
SPACECRAFT INSTRUMENTS
Flight Technology Improvement --- spaceborne optical radiometric instruments, attitude control, and electromechanical and power subsystems
[NASA-CP-2101] N80-13152
Summary of the Flight Technology Improvement Workshop --- spaceborne optical radiometric instruments, attitude control, and electromechanical and power subsystems
N80-13153
Report of the Electromechanical Subsystems Panel --- spaceborne instrumentation technology
N80-13155
Report of the Power Sub systems Panel --- spacecraft instrumentation technology
N80-13156
Report of the Attitude Control and Attitude Determination Panel --- spacecraft instrumentation technology
N80-13157
SPACECRAFT MANEUVERS
Two-impulse reorientation of asymmetric spacecraft
[NASA-TP-1554] N80-13135
SPACECRAFT POWER SUPPLIES
Flight Technology Improvement --- spaceborne optical radiometric instruments, attitude control, and electromechanical and power subsystems
[NASA-CP-2101] N80-13152
Summary of the Flight Technology Improvement Workshop --- spaceborne optical radiometric instru-

ments, attitude control, and electromechanical and power subsystems
N80-13153
Report of the Power Sub systems Panel --- spacecraft instrumentation technology
N80-13156
PEP solar array definition study
[NASA-CR-160398] N80-13622
Baseline design of the thermoelectric reactor space power system
[LA-UR-79-1242] N80-13906

SPACECRAFT STRUCTURES
A digital computer program for the dynamic interaction simulation of controls and structure [DISCOS]. Volume 4: Supplementary documentation
[NASA-TM-80546] N80-13150

SPACELAB
Guidelines for mission integration, a summary report
[NASA-CR-161347] N80-13067
Spacelab interface development test, volume 1, sections 1-6
[NASA-CR-160411] N80-13149
Spacelab environment investigation by mass spectrometer
[BMFT-FB-W-78-02] N80-13774
Spacelab interface development tests. Software description
[NASA-CR-160394] N80-13815

SPACELAB PAYLOADS
The preparation and stability of metallic emulsions in a microgravity environment: An experiment for the First Spacelab Payload [FSLP]
N80-13081
Fabrication of composite materials under low gravity [experiment ES 310 of the First Spacelab Payload [FSLP]]
N80-13084
UHV-chamber: Theoretical background and facility development --- for dynamic contact experiments
N80-13086
The fluid physics module: A contribution to materials science and physics in space
N80-13087
Positioning and mixing instrumentation employing electrostatic and acoustic principles
N80-13088
Process chamber: Payload element of the German microgravity mission D 1
N80-13090
Functional performance of the isothermal heating facility for the material science double rack
N80-13091
Reactions between glass melts
N80-13101
Examination and selection of suitable methods for measuring the thermal conductivity of liquids in Spacelab
[BMFT-FB-W-78-09] N80-13207
Feasibility study for Spacelab user program: Propagation of electromagnetic waves
[BMFT-FB-W-78-10] N80-13344
Contributions to Marangoni convection in cylindric melting zones: Experimental simulation and calculation of the influence of gravity
[BMFT-FB-W-78-39] N80-13421

SPECIMEN GEOMETRY
Comparison tests and experimental compliance calibration of the proposed standard round compact plane strain fracture toughness specimen
[NASA-TM-81379] N80-13513
A testing machine which fulfills fixed boundary displacement conditions
[TRITA-HFL-0022] N80-13528

SPECTRAL SIGNATURES
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study --- Kansas
[E80-10012] N80-13591

SPECTROPHOTOMETRY
The spectrophotometric experiment on board the Venera-11, Venera-12 probes: Some results from the analysis of the Venus day-sky spectrum
[D-270] N80-14004

SPECTROSCOPIC ANALYSIS
Neutron spectroscopy of fast hydrogen diffusion in BCC transition metals
[BNL-26075] N80-13225
Laboratory design for modern analytical instruments
[CONF-790702-1] N80-13434

SPECTRUM ANALYSIS
Structures, spectra and related properties of titanium-, zirconium-, and hafnium-doped vitreous silica
N80-13245
Estimation of the spectral moments and quadrature cross-correlation functions and their application to troposcatter systems
N80-13322
As-built design specification for CAMS Development Dot Data System [CDDDS]
[NASA-CR-160395] N80-13816
GaAs waveguide detector array for an IOC spectrum analyzer
[AD-A073552] N80-13924
Direct measurements of the spectrum of the near millimeter cosmic background
[LBL-9374] N80-14016

SPECULAR REFLECTION
Molecular two dimensional flow of mixtures of light and heavy gases with diffuse and specular reflection
[ESA-TT-508-REV] N80-13011

SPHERES
Heat conduction from a sphere to an infinite external region
[SAND-79-0366] N80-13419

SPHERICAL CAPS
Dynamic snap-through of shallow arches and spherical caps
N80-13299

SPIN
deHass-vanAlphen measurements of spin resolved scattering in the Cu[Mn] magnetic impurity system
N80-13955

SPIN DYNAMICS
Spindown of rotating magnets --- astrophysical bodies
N80-13564

SPIN STABILIZATION
Two-impulse reorientation of asymmetric spacecraft
[NASA-TP-1554] N80-13135

SPIN TESTS
Recent spin test of two composite wagon wheel flywheels
[SAND-79-1669C] N80-13640

SPLINE FUNCTIONS
Piecewise cubic interpolation methods
[UCRL-81230] N80-13852

SPREAD SPECTRUM TRANSMISSION
Autoregressive acquisition and interference-test coding for spread spectrum communications
N80-13329

SPRINGS [ELASTIC]
On the optimization of spring elasticity, damping, and inertia effects on the spring loading of a control stick
[FB-37] N80-13776

SPUTTERING
Primary electric propulsion technology study --- for thruster wear-out mechanisms
[NASA-CR-159688] N80-13158
Co-sputtering of aluminum-silver alloy mirrors for solar reflectors
[RFP-2896] N80-13626

STABILITY DERIVATIVES
Industrial trial run of the AVA derivative balance on an Alphajet jet model in a 3 m windtunnel
[BMFT-FB-W-78-07] N80-13060

STABILITY TESTS
Floating zone stability [exp. 1-ES-331] --- on board Spacelab
N80-13078

STAINLESS STEELS
Effect of phase instabilities on the correlation of nickel ion and neutron irradiation swelling in solution annealed 316 stainless steel
[CONF-790657-2] N80-13226
Materials testing for central receiver solar-thermal power systems
[TID-29443] N80-13695
Comparison of procedures for quantitative X-ray analysis in thin films
[BNL-25759] N80-13979

STANDARDIZATION
Standardization of boom systems for sounding rocket experiments
[BMFT-FB-W-78-40] N80-13147

STANDARDS
Standard reference data program authorization
[GPO-25-887] N80-13315
Interim structural design standard for solar energy applications, phases 1 and 2 --- boiler and pressure vessel code
[SAND-79-8183] N80-13698

STAR TRACKERS
Star tracker error analysis: Roll-to-pitch nonorthogonality
[NASA-TM-80835] N80-13134
The Miranda star sensor experiment
[RAE-TR-78112] N80-13146

STATIC AERODYNAMIC CHARACTERISTICS
Supersonic stability and control characteristics of a cruciform missile model with delta wings and aft tail fin control --- Langley unitary plan wind tunnel tests
[NASA-TM-80171] N80-13000

STATIC DEFORMATION
Improved boundary-integral equation method for time-dependent inelastic deformation in metals
[COO-2733-20] N80-13230

STATIC ELECTRICITY
Quasistatic electric fields observed during a number of magnetopause crossings by ISEE-1
N80-13535

STATIC TESTS
Development and description of a device for static strength measurement in the armed forces examination and entrance station
[AD-A068684] N80-13765

STATISTICAL ANALYSIS
Application of modified profile analysis to function testing of the motion/no-motion issue in an aircraft ground-handling simulation --- statistical analysis procedure for man machine systems flight simulation
[NASA-TP-1540] N80-13024
Statistical techniques for automating the detection of anomalous performance in rotating machinery
[CONF-790435-2] N80-13481
Solar-climactic statistical study --- windpower utilization and solar energy conversion
[HCP/T4016-01/2] N80-13747
A study of possible sea state information in the sample and hold gate statistics for the GEOS-3 satellite altimeter
[NASA-CR-156858] N80-13753
Statistical analysis of finite mixtures of exponential and Weibull distributions
N80-13857
Recent applications of variational techniques in statistics
[AD-A073511] N80-13868

STATISTICAL DISTRIBUTIONS
An empirical power study of recursive outlier detection procedures
N80-13854
Detection of multivariate outliers --- in normal data
N80-13861
Bayesian parameter and reliability estimation for a multivariate exponential distribution
N80-13862

STEADY FLOW
Steady and oscillatory Marangoni convection in floating zones under 1g
N80-13111

STEAM FLOW
Pitot tube and drag body measurements in transient steam-water flows
[CONF-790505-15] N80-13416

STEEL STRUCTURES
Friction characteristic of steel skids equipped with skegs on a lakebed surface --- landing gear
[NASA-TM-81347] N80-13027

STEELS
Section size effects on toughness of various cast steels
N80-13210
Stress-assisted isothermal martensitic transformation and transformation plasticity
[AD-A073433] N80-13222
Combined macroscopic and microscopic approach to the fracture of metals
[COO-3084-69] N80-13229
Plastic flow of mild steel under proportional and non-proportional straining at a controlled rate
[OUEL-1280/79] N80-13241
Development of automated welding processes for field fabrication of thick-walled pressure vessels: Electron beam method
[DOE/ET-2606/4] N80-13476
Development of automated welding processes for field fabrication of thick-walled pressure vessels: Electron beam method
[FE-2606-5] N80-13484

STELLAR ATMOSPHERES
Instabilities of accretion disk: Magnetosphere interfaces
N80-13562
The magnetospheres of magnetic A stars and of pulsars
N80-13565
The boundary of a pulsar magnetosphere: Gamma-ray pulsars
N80-13566

STELLAR EVOLUTION
Star formation
[UCRL-81758] N80-14001

STELLAR MAGNETIC FIELDS
Interaction of accretion disk and rotating magnetic field of neutron star
N80-13563

STELLAR MASS ACCRETION
Instabilities of accretion disk: Magnetosphere interfaces
N80-13562
Interaction of accretion disk and rotating magnetic field of neutron star
N80-13563

STELLAR MODELS
Star formation
[UCRL-81758] N80-14001

STELLAR ROTATION
Spindown of rotating magnets --- astrophysical bodies
N80-13564
The magnetospheres of magnetic A stars and of pulsars
N80-13565

STEREOTELEVISION
A field of view simulator equipped for perspective transformation on a television raster
[FB-34] N80-13775

STIRLING CYCLE
Assessment of Stirling engine potential in total and integrated energy systems
[ANL/ES-76] N80-13636
Assessment of the state of technology of automotive Stirling engines
[NASA-CR-159631] N80-13989

STOCHASTIC PROCESSES
Transients effects in M/G/1 queues; an empirical investigation
[AD-A073744] N80-13833

Control kernels and constant-rate jump processes N80-13836
Duality theory, stochastic realization and invariant directions for linear discrete-time stochastic systems N80-13858
Stochastic intergration using random point processes N80-13860
Asymptotic theory for process least squares estimators for diffusion processes
[AD-A073577] N80-13864

STOKES LAW OF RADIATION
Anti-Stokes emission as a VUV and soft X-ray source
[NASA-CR-162266] N80-13923

STORAGE BATTERIES
Assessment of technical and economic feasibility of zinc/bromine batteries for utility load leveling
[EPRI-EM-1059] N80-13659

STORAGE STABILITY
Heat transfer in high-level waste management
[CONF-790822-1] N80-13919

STORAGE TANKS
Retrievable storage concept designs
[UCRL-15018] N80-13920

STORMS [METEOROLOGY]
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598

STRAIN HARDENING
Strain hardening and ductility of iron: Axisymmetric vs. plane strain elongation
[COO-4072-2] N80-13234

STRAIN RATE
Plastic flow of mild steel under proportional and non-proportional straining at a controlled rate
[OUEL-1280/79] N80-13241

STRATOSPHERE
Numerical simulation of sudden stratospheric warnings
[NASA-CR-162505] N80-13744

STRESS ANALYSIS
Temperature and thermal stress analysis of a switching tube anode
[UCID-18049] N80-13379
A new equilibrium finite element analysis of stresses in orthotropic cylinders with temperature dependent material properties N80-13506
Application of finite element programs APES, ASAS and MARC to linear fracture mechanics
[LTR-ST-1118] N80-13511
Analysis of surface cracks in finite plates under tension or bending loads
[NASA-TP-1578] N80-13512
Elastic plastic analysis of growing cracks
[COO-3084-65] N80-13517

STRESS CONCENTRATION
Current methods for analyzing dynamic cable response --- vibration N80-13500
Comparison tests and experimental compliance calibration of the proposed standard round compact plane strain fracture toughness specimen
[NASA-TM-81379] N80-13513
Acoustic techniques for measuring stress regions in materials
[EPRI-NP-1043] N80-13525

STRESS CORROSION CRACKING
Specificity hydrogen and stress corrosion cracking in austenitic stainless steel N80-13208
The influence of thermal history, deformation, and composition, on stress corrosion cracking of ferritic stainless steels N80-13211

STRESS MEASUREMENT
Acoustic techniques for measuring stress regions in materials
[EPRI-NP-1043] N80-13525
In situ stress field in the southeastern United States and its implication
[DP-MS-78-95] N80-13733

STRUCTURAL ANALYSIS
Design assessment of advanced technology lightweight, low-cost mission-configured gondola modules
[AD-A073554] N80-13029
Wind excited behavior of structures, 2 N80-13305
Approximate techniques for plastic deformation of structures under impulsive loading, 2 N80-13313
Dipolar defect structure of laser and other transparent materials --- study of dielectric properties of insulators
[AD-A073815] N80-13458
Limit theorems for the reliability of series-parallel load-sharing systems N80-13487
Pattern recognition methods for acoustic emission analysis
[NUREG-CR-0910] N80-13883
Studies in structure and magnetic short range order. 1: Structure in amorphous germanium. 2: Magnetic interactions in gadolinum gallium garnet N80-13956

STRUCTURAL DESIGN
Aerodynamic design of an extended-range guided bomb
[LOG-C3719] N80-13023
Active flutter control for flexible vehicles, volume 1
[NASA-CR-159160] N80-13053
Structural optimization under shock and vibration environment N80-13496
Interim structural design standard for solar energy applications, phases 1 and 2 --- boiler and pressure vessel code
[SAND-79-8183] N80-13698
Weight minimization of sandwich type solar collector panels
[SAND-78-2305C] N80-13710
OTEC platform configuration and integration. Volume 2: Technical concept
[DOE/ET-4065/1-VOL-2] N80-13712
OTEC platform configuration and integration, appendixes to volume 2
[DOE/ET-4065/1-VOL-2-APP] N80-13713
OTEC platform configuration and integation. Volume 3: Project plan
[DOE/ET-4065/1-VOL-3] N80-13714
Retrievable storage concept designs
[UCRL-15018] N80-13920

STRUCTURAL DESIGN CRITERIA
The acoustic characteristics of the RAE 1.5m wind tunnel --- modifications and test results
[RAE-TR-79002] N80-13062
Optimal design of elastic structures for stability under multiple loads N80-13504
OTEC platform configuration and integration. Volume 2: Technical concept
[DOE/ET-4065/1-VOL-2] N80-13712
Spent fuel receipt and lag storage facility for the spent fuel handling and packaging program --- structural design criteria for light waste water disposal storage
[DPSTD-SFHP-78-10] N80-13905

STRUCTURAL ENGINEERING
An investigation of multi-axial creep characteristics of metals
[NEL-661] N80-13242
Figure control for a segmented telescope mirror
[LBL-8621] N80-13997

STRUCTURAL FAILURE
Deformation and failure information from composite materials via acoustic emission
[UCRL-81272] N80-13177
Recommendation of a triaxial failure theory for graphite
[GA-A-15333] N80-13521

STRUCTURAL PROPERTIES [GEOLOGY]
Crustal structure in areas of active crustal accretion N80-13727
Average structure of the upper Earth mantle and crust between Albuquerque and the Nevada test site
[SAND-79-0975] N80-13732

STRUCTURAL RELIABILITY
Build 2 of an accelerated mission test of a TF-41 with block 76 hardware --- investigation of structural reliability of engine parts of a turbofan engine
[AD-A073436] N80-13050

STRUCTURAL STABILITY
Optimal design of elastic structures for stability under multiple loads N80-13504

STRUCTURAL STRAIN
Approximate techniques for plastic deformation of structures under impulsive loading, 2 N80-13313

STRUCTURAL VIBRATION
The shock and vibration digest, volume 11, number 4
[AD-A067426/7] N80-13302
Wind excited behavior of structures, 2 N80-13305
The shock and vibration digest, volume 11, number 7
[AD-A072745/3] N80-13310
Dynamic analysis of complex multi-level flexible rotor systems --- vibration calculations N80-13509

SUBGROUPS
The complexity of the maximum subgraph problem N80-13809
On congruence subgroup problem and related topics N80-13873

SUBMARINES
A comparison of control simulators having force inputs and displacement feedback. Applications to the manual control of underwater vehicles
[FB-38] N80-13777

SUBROUTINES
Digital filtering techniques for use in minicomputers
[Y-2184] N80-13380
As-built design specification for CAMS Development Dot Data System [CDDDS]
[NASA-CR-160395] N80-13816

SUBSONIC FLUTTER
The development of active control and its application to flutter suppressors --- wind tunnel test results
[AAAF-NT-79-02] N80-13056

SUBSONIC WIND TUNNELS
The acoustic characteristics of the RAE 1.5m wind tunnel --- modifications and test results
[RAE-TR-79002] N80-13062

SUBSTRATES
Investigation into the effect of plasma pretreatment on the adhesion of parylene to various substrates
[NASA-TM-79224] N80-13473

SULFATES
Reactions of calcium orthosilicate and barium zirconate with oxides and sulfates of various elements
[NASA-TM-79272] N80-13256

SULFIDES
Engineering development of lithium/metal sulfide battery technology for vehicle propulsion
[ANL-79-1] N80-13685

SULFUR
Unidirectional solidification of eutectic iron-carbon alloys and the segregation of sulfur N80-13085

SULFUR OXIDES
Application of synthetic molecular sieve zeolites and silica gel toward the separation of sulfur dioxide from combustion gases N80-13180

SUPERCONDUCTING MAGNETS
Eight-tesla synchroton dipoles: Design alternatives
[LBL-8410] N80-13376

SUPERCONDUCTIVITY
Superconducting properties of [Nb,Ta]3Sn wires fabricated by the bronze process
[BNL-26391] N80-13383

SUPERCONDUCTORS
Superconducting properties of [Nb,Ta]3Sn wires fabricated by the bronze process
[BNL-26391] N80-13383
Heterodyne detection and generation of microwave radiation by superconducting microbridges in a resonant structure N80-13954

SUPERCOOLING
Application of rapid solidification techniques to aluminum alloys --- mathematical model
[AD-A073443] N80-13223

SUPERCRITICAL WINGS
A theoretical study of the supercritical aerofoil NLR 7301, and comparison with experiments --- shock tunnel tests
[RAE-TR-78119] N80-13010

SUPERPOSITION [MATHEMATICS]
The implementation and practical verification of a superposition method for the solution of elastic crack problems
[RAE-TM-STRUCT-940] N80-13527

SUPERSONIC CRUISE AIRCRAFT RESEARCH
Transonic aerodynamic characteristics of a supersonic cruise aircraft research model with the engines suspended above the wing
[NASA-TM-80145] N80-12997
Economic study of multipurpose advanced high-speed transport configurations
[NASA-CR-159126] N80-13986

SUPERSONIC FLIGHT
Supersonic stability and control characteristics of a cruciform missile model with delta wings and aft tail fin control --- Langley unitary plan wind tunnel tests
[NASA-TM-80171] N80-13000

SUPERSONIC SPEEDS
Investigation of flow characteristics over missile bodies at supersonic speeds
[NASA-TP-1579] N80-13001

SUPERSONIC TRANSPORTS
Economic study of multipurpose advanced high-speed transport configurations
[NASA-CR-159126] N80-13986

SUPPLYING
Current U. S. petroleum situation and short-term supply/demand outlook
[DOE/EIA-0184/5] N80-13607

SURFACE COOLING
A fundamental study of liquid spray evaporation at a heated surface
[NASA-CR-160409] N80-13405

SURFACE CRACKS
Microscopic mechanisms and mechanics of craze growth and fracture in polystyrene N80-13507
Analysis of surface cracks in finite plates under tension or bending loads
[NASA-TP-1578] N80-13512
Surface-crack characterization by use of dynamic photoelastic spectroscopy
[IS-M-211] N80-13514

SURFACE ENERGY
Fracture studies in ceramics with particular emphasis on beta''-alumina N80-13243
A universal model for the surface energy of solids
[AD-A073671] N80-13969

SURFACE FINISHING
Plasma cleaning end-of-process detection --- using optical emission techniques
[BDX-613-2229-REV] N80-13384

SURFACE LAYERS
Initial epitaxy and interdiffusion phenomena in Au-Cu bilayers --- microstructure N80-13948

SURFACE PROPERTIES
Cell adhesion as influenced by substrate surface properties
N80-13252
Photopolarimetry of scattering surfaces and their interpretation by computer model
[NASA-CR-162514] N80-14002
SURFACE REACTIONS
Optical reflectance studies of adsorption and reaction on platinum
N80-13183
Damage of metal surfaces by a hot, dense deuterium plasma
N80-13212
SURFACE ROUGHNESS
Evaporative cooling on a grooved surface
[NASA-CR-160410] N80-13401
Scattering of ultrasonic waves by periodically roughened surfaces --- detection of surface erosion
[CONF-790505-17] N80-13884
SURFACE TEMPERATURE
Evaporative cooling on a grooved surface
[NASA-CR-160410] N80-13401
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
The estimation of soil moisture content and actual evapotranspiration using thermal infra-red remote sensing --- Buckinghamshire, England
[E80-10021] N80-13599
Beauce TELLUS project --- France
[E80-10024] N80-13600
Estimation of regional evapotranspiration and soil moisture conditions using remotely sensed crop surface temperatures
[REPT-1003] N80-13616
Atmospheric correction of surface temperature measurements in a 10.5 to 12.5 micron channel from AVHRR/TIROS-N
N80-13739
Warm/cold cloud processes
[NASA-CR-161336] N80-13743
SURFACE WATER
Space Observations for water resources: A potential to be developed
N80-13609
SURFACTANTS
Phase behavior and interfacial tension studies of surfactant systems
N80-13395
SURGES
Photovoltaic transient analysis program user's guide. Volume 1: Executive summary
[SAND-78-7038-VOL-1] N80-13704
SWEAT COOLING
A numerical solution for temperature distributions in a discrete injection transpiration-cooled nosetip system
[AD-A073340] N80-13406
SWITCHING CIRCUITS
Shock-induced electrical switching in polymeric films
[CONF-790540-11] N80-13264
SYMMETRICAL BODIES
A fluid mechanical-kinetic theory description of a spherically symmetric discharge in a neutral medium
N80-13464
SYMMETRY
A theory for the asymmetry in the auroral ionization density profile for the generation of auroral infrasonic waves
N80-13729
Invariant tests for scale parameters under elliptical symmetry
N80-13855
SYNCHRONOUS MOTORS
An explicit state model of a synchronous machine - transformer - SCR bridge unit
N80-13357
Induction and synchronous machines for vertical axis wind turbines
[SAND-79-7017] N80-13675
SYNCHROTRON RADIATION
Precision determination of atomic level energies by absorption spectrometry with synchrotron radiation
N80-13888
Measurement of the inelastic x-ray scattering cross section of neon with synchroton radiation
N80-13889
SYNCHROTRONS
Eight-tesla synchroton dipoles: Design alternatives
[LBL-8410] N80-13376
SYNTHETIC FIBERS
Thermal shrinkage mechanisms of poly[ethylene terephthalate] fibers
N80-13246
SYNTHETIC FUELS
Environmental analysis of synthetic liquid fuels --- shale oil, coal liquefaction, and biomass production of ethanol
[DOE/EV-0044] N80-13279
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels [riser cracking of coal]
[FE-2307-46] N80-13280
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-33] N80-13287
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-30] N80-13291
Synfuel [hydrogen] production from fusion power
[LA-UR-79-1115] N80-13296
SYSTEM EFFECTIVENESS
Establishment criteria for Distance Measurement Equipment [DME] with instrument landing system and/or localizer approach
[AD-A069818] N80-13016
Further development of the Radio-ANA-System
[BMFT-FB-M-78-05] N80-13021
SYSTEMS ANALYSIS
In depth review of the 1979 AIAA Lighter-Than-Air Systems Technology Conference
[NASA-TM-81158] N80-12991
Installation criteria for the Approach Lighting System Improvement Program [ALSIP]
[AD-A070076] N80-13057
Space construction system analysis, final review. Part 1: Executive summary
[NASA-CR-160286] N80-13063
Solar power satellite system definition study. Volume 1, phase 1: Executive summary
[NASA-CR-160370] N80-13139
Solar power satellite system definition study. Volume 2, phase 1: Systems analyses tradeoffs.
[NASA-CR-160371] N80-13140
Solar power satellite system definition study. Volume 3: Reference system description, phase 1
[NASA-CR-160372] N80-13141
Solar power satellite system definition study. Volume 5, phase 1: Executive summary
[NASA-CR-160374] N80-13143
Solar power satellite system definition study. Volume 6, phase 1: Space construction and transportation
[NASA-CR-160375] N80-13144
Solar power satellite system definition study. Volume 7, phase 1: SPS and rectenna systems analyses
[NASA-CR-160376] N80-13145
Overlapped sub-array scanning antenna study
[AD-A070939] N80-13339
An analytical investigation of three-dimensional vibration in gear-coupled rotor systems
N80-13471
Analysis techniques of experimental frequency response data
N80-13497
OTEC system response and control analysis
[CONF-790631-2] N80-13657
Solar cooling performance in CSU Solar House 3
[COO-2858-23] N80-13668
OTEC platform configuration and integration, executive summary
[DOE/ET-4065/1] N80-13711
Experimental FLIR study
[AD-A073361] N80-13926
Technical support for open-cycle MHD program --- magnetohydrodynamic/boiler power systems analysis
[ANL/MHD-79-4] N80-13937
deHass-vanAlphen measurements of spin resolved scattering in the Cu[Mn] magnetic impurity system
N80-13955
SYSTEMS COMPATIBILITY
Problems posed by the integration of materials science experiments with spacecraft systems
N80-13124
SYSTEMS ENGINEERING
Mechanical power system for aircraft intermittent utility functions --- systems engineering of using flywheels for aircraft control equipment
[AD-A073297] N80-13030
Space fabrication demonstration system. Composite beam cap fabricator development, phase 1 and 2
[NASA-CR-161348] N80-13068
Feasibility study within the Spacelab utilization program: Common equipment, communication/navigation [COMNAV]
[BMFT-FB-W-78-36] N80-13130
Curing and flow of thermosetting resins for composite material pultrusion
N80-13244
A purely chemical HBr laser
[AD-A060841] N80-13454
Design and development of a 30 watt solid polymer electrolyte fuel cell power source fueled with calcium hydride
[AD-A071157] N80-13625
Systems engineering for power, program report
[DOE/ET-0012/2-REV] N80-13637
OTEC platform configuration and integration. Volume 1: Systems engineering and integration
[TID-29418] N80-13655
Photovoltaic systems. Program summary
[DOE/ET-0019/2] N80-13691
Use of virtual machines in the development of decision support systems
[AD-A073748] N80-13792
Remote systems requirements of the High Yield Lithium Injection Fusion Energy [HYLIFE] converter concept --- systems engineering of remote sensors for inspection of fusion reactor electric power plant
[UCRL-81309] N80-13908
X-ray and gamma ray transmission densitometry
[CONF-790692-1] N80-13910
Recent advances in design for low and medium-energy heavy ion accelerators
[CONF-790327-7] N80-13912
BNL three-stage tandem accelerator facility --- discussion of systems engineering for heavy ions accelerator test facility
[BNL-26211] N80-13915
Broadly tunable picosecond IR source
[LA-UR-79-1474] N80-13928
SYSTEMS MANAGEMENT
Operational procedures for ground station operation: ATS-3 Hawaii-Ames satellite link experiment
[NASA-TM-81155] N80-13333

T

TABLES [DATA]
Table of space vehicles: 1973 - 1978
[RAE-TM-SPACE-271] N80-13126
Meteorological and oceanographic observations on board Dutch light vessels and the light platform 'Goeree' in the North Sea
[KNMI-141-26] N80-13749
Meteorological observations in the Netherlands for 1977
[KNMI-97-129] N80-13750
TANTALUM
Superconducting properties of [Nb,Ta]3Sn wires fabricated by the bronze process
[BNL-26391] N80-13383
TANTALUM NITRIDES
Electron microprobe analysis of tantalum-nitride thin films
[BDX-613-1198-REV] N80-13967
TARGET ACQUISITION
Physical processes affecting the performance of high-power, frequency-doubled short-pulse laser systems: Analysis, simulation, and experiment
N80-13437
TASK COMPLEXITY
On the interaction between system and task parameters through continuous manual control
[FB-42] N80-13780
TDR SATELLITES
Application of a tracking and Data Relay Satellite System [TDRSS] to European requirements
[BMFT-FB-W-78-37] N80-13131
TECHNICAL WRITING
Scientific literature: Can we keep it from ruining science
[UCRL-81118] N80-13985
TECHNOLOGY ASSESSMENT
Design assessment of advanced technology lightweight, low-cost mission-configured gondola modules
[AD-A073554] N80-13029
The near-term potential of manufacturing in space
N80-13125
Report of the Electromechanical Subsystems Panel --- spaceborne instrumentation technology
N80-13155
Report of the Power Sub systems Panel --- spacecraft instrumentation technology
N80-13156
Report of the Attitude Control and Attitude Determination Panel --- spacecraft instrumentation technology
N80-13157
Characteristic parameters in combustion processes and their accessibility to current and future diagnostics
[ORO-5773-T1] N80-13197
Status of alcohol fuels utilization technology for stationary gas turbines
[HCP/M2098-03] N80-13283
A review of research into oscillating boundary layers
[AAAF-NT-79-04] N80-13423
Nuclear excitation of CO2 and CO
N80-13447
Nuclear pumped lasers: Advantages of O2 [1 delta]
N80-13451
Space Observations for water resources: A potential to be developed
N80-13609
Solar energy perspectives for public power
[SERI/TP-35-300] N80-13635
Process optimization of industrial energy use
[BNL-26482] N80-13650
Multi-year plan for thermal and mechanical energy storage program
[DOE/ET-0109] N80-13658
Status of development, energy and economics aspects of alternative technologies --- energy policy and technology with respect to coal utilization
[CONF-790371-1] N80-13689
Geothermal energy. Part 3: Technology and general studies, volume 4. Citations from the NTIS data base
[NTIS/PS-79/0817/1] N80-13719

A review of the research at NGTE concerning the effects of flight on engine exhaust noise
[NGTE-R-78007] N80-13887
Recent advances in design for low and medium-energy heavy ion accelerators
[CONF-790327-7] N80-13912
Optical digital techniques
[NASA-CR-160392] N80-13922
Assessment of the state of technology of automotive Stirling engines
[NASA-CR-159631] N80-13989
A technical and economic evaluation of the project in Baltimore, Maryland, volume 2 --- waste processing plant
[PB-297871/6] N80-13991
A technical and economic evaluation of the project in Baltimore, Maryland, Volume 3 --- waste processing plant
[PB-297872/4] N80-13992
A technical and economic evaluation of the project in Baltimore, Maryland, volume 4 --- waste processing plant
[PB-297873/2] N80-13993

TECHNOLOGY TRANSFER
Review of supporting research at Oak Ridge National Laboratory for underground coal conversion
[CONF-790630-9] N80-13295
Texas applications system verification and transfer remote sensing information subsystem: Functional design
[E80-10017] N80-13596
Federal Laboratory Consortium for Technology Transfer. Far West Region Local Government Assistance Task Force
[UCID-18037-79-2] N80-13990

TECHNOLOGY UTILIZATION
Technology development needs for high temperature process heat
[SERI/TR-35-047] N80-13669
Industrial applications of advanced energy systems
[CONF-790602-54] N80-13708

TECTONICS
Summaries of physical research in the geosciences
[DOE/ER-0030] N80-13582

TELLURIC CURRENTS
Dayside aurora and substorm current systems
N80-13555

TELLURIUM
Investigation of the structure of Te-Se solid solutions obtained under different gravity conditions on board the Salyut 6 station, in a centrifuge
N80-13074
Difference frequency mixing in insulating GaAs and magnetooptical studies in Hg0.89Mno.11Te
N80-13952

TEMPERATURE DEPENDENCE
Temperature dependence of the viscosity of some crude oils and pure liquids
N80-13182
Stress-assisted isothermal martensitic transformation and transformation plasticity
[AD-A073433] N80-13222

TEMPERATURE DISTRIBUTION
Experimental investigation of the local density and temperature distribution in the flow field around a sphere with high thermodynamic nonequilibrium using the electron beam technique
[ESA-TT-516-REV] N80-13012
A numerical solution for temperature distributions in a discrete injection transpiration-cooled nosetip system
[AD-A073340] N80-13406

TEMPERATURE EFFECTS
The influence of thermal history, deformation, and composition, on stress corrosion cracking of ferritic stainless steels
N80-13211
Thermal shrinkage mechanisms of poly[ethylene terephthalate] fibers
N80-13246
Transient thermal effects in disc brakes
N80-13465

TEMPERATURE GRADIENTS
The effects of Joule heat on turbulent dispersion of temperature in high Reynolds number flow
N80-13396

TEMPERATURE MEASUREMENT
Atmospheric correction of surface temperature measurements in a 10.5 to 12.5 micron channel from AVHRR/TIROS-N
N80-13739

TEMPERATURE PROFILES
Temperature and flow measurements on near-freezing aviation fuels in a wing-tank model
[NASA-TM-79285] N80-13268

TENSILE CREEP
An investigation of multi-axial creep characteristics of metals
[NEL-661] N80-13242

TENSILE STRENGTH
Section size effects on toughness of various cast steels
N80-13210
Effect of electron irradiation on the strength of niobium single crystals
N80-13961

TENSILE STRESS
Analysis of surface cracks in finite plates under tension or bending loads
[NASA-TP-1578] N80-13512

TENSOR ANALYSIS
Mathematical Modeling of Diverse Phenomena
[NASA-SP-437] N80-13839

TERMINAL BALLISTICS
Method for describing nearly normal penetration of an ogive nosed penetrator into terrestrial targets
[SAND-79-0721] N80-13479

TERNARY SYSTEMS
A study of ternary systems containing an acidic copolymer, a basic copolymer and a solvent
N80-13250

TERPENES
Preparation and characterization of polymers formed by irradiation of beta-pinene and other monomers
N80-13249

TERRADYNAMICS
Method for describing nearly normal penetration of an ogive nosed penetrator into terrestrial targets
[SAND-79-0721] N80-13479

TERRAIN ANALYSIS
Remote sensing applied to geology and mineralogy. A bibliography with abstracts
[NTIS/PS-79/0844/5] N80-13612

TEST FACILITIES
Test plan for the Mead 25-kW Photovoltaic Flexible Test Facility, 1979
[COO-4094-53] N80-13692
BNL three-stage tandem accelerator facility --- discussion of systems engineering for heavy ions accelerator test facility
[BNL-26211] N80-13915

TEXAS
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595
Texas applications system verification and transfer remote sensing information subsystem: Functional design
[E80-10017] N80-13596
Geopressure energy resource evaluation --- Texas and Louisiana
[ORNL/PPA-79/2] N80-13605

THEMATIC MAPPING
Digital processing of LANDSAT MSS and topographic data to improve capabilities for computerized mapping of forest cover types --- Colorado and Washington
[E80-10009] N80-13588
Snow mapping from space platforms
N80-13611

THERAPY
Resuscitation from hypothermia: A literature review
[AD-A069093] N80-13764

THERMAL BATTERIES
Development of a lithium alloy/iron disulfide, 60-minute primary thermal battery
[SAND-79-0814] N80-13684

THERMAL BLOOMING
Physical processes affecting the performance of high-power, frequency-doubled short-pulse laser systems: Analysis, simulation, and experiment
N80-13437
Time dependent propagation of high-energy laser beams through the atmosphere, 4
[UCRL-52654] N80-13461

THERMAL CONDUCTIVITY
Examination and selection of suitable methods for measuring the thermal conductivity of liquids in Spacelab
[BMFT-FB-W-78-09] N80-13207
A new thermal conductivity apparatus for small conducting specimens and measurememts on niobium monoxide --- measuring thermal conductivity, electrical resistivity, and thermoelectric power
N80-13428

THERMAL CYCLING TESTS
Hygrothermal damage mechanisms in graphite-epoxy composites
[NASA-CR-3189] N80-13170

THERMAL DIFFUSION
Experiment SYRENA 1, 2, 3: Space processing of CdHgTe, CdHgTe and PbSeTe
N80-13076
Influence of the space environment on some materials processing phenomena
N80-13077

THERMAL DISSOCIATION
Photochemistry of dinitrogen pentoxide
[LBL-9034] N80-13206

THERMAL ENERGY
Low-temperature thermal energy storage program annual operating plan
[ORNL/TM-6934] N80-13631
Large-scale annual-cycle thermal energy storage in aquifers
[CONF-790515-3] N80-13686

THERMAL MAPPING
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
The estimation of soil moisture content and actual evapotranspiration using thermal infra-red remote sensing --- Buckinghamshire, England
[E80-10021] N80-13599
Beauce TELLUS project --- France
[E80-10024] N80-13600

THERMAL PROTECTION
Development and evaluation of an ablative closeout material for solid rocket booster thermal protection system
[NASA-TM-78241] N80-13258

THERMAL RESISTANCE
Fire-resistant materials for aircraft passenger seat construction
[NASA-TM-78617] N80-13255

THERMAL RESOURCES
OTEC thermal response report for Pacific plant ship, 5 to 10 deg N 90 to 95 deg W
[HCP/T2898-01/3] N80-13656

THERMAL SHOCK
Application of static and dynamic crack arrest theory to thermal shock experiment TSE-4 --- fracture behavior of reactor pressure vessels
[NUREG-CR-0767] N80-13524

THERMAL STABILITY
Thermal stability and decomposition kinetics of amorphous hydrogenated films
[CONF-790442-12] N80-13199

THERMAL STRESSES
Temperature and thermal stress analysis of a switching tube anode
[UCID-18049] N80-13379

THERMOCLINES
Thermal faceting behavior of single crystal aluminum oxide
N80-13960

THERMODYNAMIC CYCLES
Analysis of binary thermodynamic cycles for a moderately low-temperature geothermal resource
[TREE-1365] N80-13627
OTEC system response and control analysis
[CONF-790631-2] N80-13657

THERMODYNAMIC EFFICIENCY
Evaluation of combined photovoltaic/thermal collectors
[COO-4577-8] N80-13665
Thermal performance of buildings and building envelope systems: An annotated bibliography
[LBL-8925] N80-13680
Assessment of the state of technology of automotive Stirling engines
[NASA-CR-159631] N80-13989

THERMODYNAMIC EQUILIBRIUM
Thermodynamics and dynamics of line phases
N80-13105
Computational of physical and chemical equilibria
N80-13184

THERMODYNAMIC PROPERTIES
Hygrothermal damage mechanisms in graphite-epoxy composites
[NASA-CR-3189] N80-13170

THERMODYNAMICS
Catalyst deactivition and fixed bed reactor modeling
N80-13181
A numerical solution for temperature distributions in a discrete injection transpiration-cooled nosetip system
[AD-A073340] N80-13406
Multi-year plan for thermal and mechanical energy storage program
[DOE/ET-0109] N80-13658
Absence of crystalline order in two-dimensions --- thermodynamic study of electron transitions in crystal structure for crystalline order
[AD-A073672] N80-13968

THERMOELECTRIC GENERATORS
Solar central receiver prototype heliostat CDRL item B.D., volume 1
[SAN-1605/7-VOL-1] N80-13700

THERMOELECTRIC POWER GENERATION
Assessment of Stirling engine potential in total and integrated energy systems
[ANL/ES-76] N80-13636
Baseline design of the thermoelectric reactor space power system
[LA-UR-79-1242] N80-13906

THERMOELECTRICITY
A new thermal conductivity apparatus for small conducting specimens and measurememts on niobium monoxide --- measuring thermal conductivity, electrical resistivity, and thermoelectric power
N80-13428

THERMOGRAVIMETRY
A thermogravimetric system for investigating gas-metal reactions at elevated temperatures
[AD-A073412] N80-13194
THERMOHYDRAULICS
Condensor operated inverse thermosiphons
[NEL-659] N80-13422
THERMOPHYSICAL PROPERTIES
Property changes in graphite irradiated at changing irradiation temperature
[GA-A-15270] N80-13178
Transient thermal analysis of phase change material energy storage system
N80-13618
THERMOPLASTICITY
Thermoviscoplastic response of cylindrical structures using a state variable model
[COO-2733-19] N80-13516
THERMOSETTING RESINS
Curing and flow of thermosetting resins for composite material pultrusion
N80-13244
Synthesis of improved polyester resins
[NASA-CR-159665] N80-13257
THERMOSIPHONS
Condensor operated inverse thermosiphons
[NEL-659] N80-13422
THERMOSPHERE
Effects of rocket exhaust products in the thermosphere and ionosphere
[LA-7926-MS] N80-13167
Studies on the thermosphere and ionosphere based on a detailed analysis of topside ionograms
[BMFT-FB-W-78-01] N80-13736
THETA PINCH
Multiple-pass carbon dioxide laser heating of a theta-pinch plasma
N80-13936
THICK WALLS
Fractographic study of a thick wall pressure vessel failure --- safety and reliability of nuclear pressure vessels
[CONF-790730-2] N80-13522
THICKNESS
Apparatus for measurement of tissue compliance
[BMFT-FB-W-78-05] N80-13768
THIN FILMS
Membrane oxygen enrichment cost and application evaluation
[ANL-78-108] N80-13205
Thin film problems and research in energy systems
[CONF-761168-SUMM] N80-13705
Initial epitaxy and interdiffusion phenomena in Au-Cu bilayers --- microstructure
N80-13948
Electron microprobe analysis of tantalum-nitride thin films
[BDX-613-1198-REV] N80-13967
Comparison of procedures for quantitative X-ray analysis in thin films
[BNL-25759] N80-13979
THIN WALLED SHELLS
Finite element linear models for symmetrically loaded thin shells of revolution
[LA-UR-79-1321] N80-13515
THOMSON SCATTERING
Stimulated Thomson scattering
N80-13330
THREE DIMENSIONAL FLOW
Three-dimensional viscous hypersonic flows over general bodies using shock-layer and parabolized Navier-Stokes equations
N80-12993
The development of a drag sensing three dimensional turbulent ball probe --- Ames 6 ft by 6 ft wind tunnel
[NASA-CR-152269] N80-13427
THREE DIMENSIONAL MOTION
An analytical investigation of three-dimensional vibration in gear-coupled rotor systems
N80-13471
A field of view simulator equipped for perspective transformation on a television raster
[FB-34] N80-13775
THUNDERSTORMS
Jet transport performance in thunderstorm wind shear conditions
[NASA-CR-3207] N80-13742
TIDES
Tidal pressure response as a reservoir engineering tool
[UCRL-83012] N80-13647
The ocean tide and waves beneath the Ross Ice Shelf, Antarctica
N80-13751
TIMBER INVENTORY
Digital processing of LANDSAT MSS and topographic data to improve capabilities for computerized mapping of forest cover types --- Colorado and Washington
[E80-10009] N80-13588
TIME DEPENDENCE
Time dependent propagation of high-energy laser beams through the atmosphere, 4
[UCRL-52654] N80-13461
Surface motion and confinement potential for a microwave confined corona
[UCID-18227] N80-13943
TIME DIVISION MULTIPLE ACCESS
The George 3 and 4 accounting system
[RAE-TR-78080] N80-13983
TIME SERIES ANALYSIS
A density-quantile function approach to choosing order statistics for the estimation of location and scale parameters
[AD-A073270] N80-13866
TIME SHARING
The analysis of processor-time trade-off opportunities in a reconfigurable multi-processor system
N80-13783
PDP-11 computer monitoring system
[AD-A072966] N80-13790
TIN
Melting behavior of small tin crystallites
N80-13950
TIROS N SATELLITE
Atmospheric correction of surface temperature measurements in a 10.5 to 12.5 micron channel from AVHRR/TIROS-N
N80-13739
TISSUES [BIOLOGY]
Apparatus for measurement of tissue compliance
[BMFT-FB-W-78-05] N80-13768
TITANIUM
Structures, spectra and related properties of titanium-, zirconium-, and hafnium-doped vitreous silica
N80-13245
TITANIUM ALLOYS
Chemistry and heat treatment effects on mechanical and microstructural properties of heat-treated, beta-extruded Ti-6Al-6V-2Sn
[BDX-613-2170-REV] N80-13224
TOKAMAK DEVICES
The study of MHD instabilities in elongated tokamaks --- plasma control
N80-13935
Multimegawatt neutral beams for Tokamaks
[LBL-8891] N80-13938
Scaling studies of beam-heated tokamaks
[ORNL/TM-6584] N80-13939
NFREYA: A Monte Carlo beam deposition code for noncircular Tokamak plasmas
[ORNL/TM-6845] N80-13944
TOPOGRAPHY
Digital processing of LANDSAT MSS and topographic data to improve capabilities for computerized mapping of forest cover types --- Colorado and Washington
[E80-10009] N80-13588
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
Crustal structure in areas of active crustal accretion
N80-13727
TOPOLOGY
Interconnection networks in multiple-processor systems --- communication networks
N80-13784
TOROIDAL PLASMAS
Phase measurements of fast wave toroidal eigenmodes --- resonant frequencies
N80-13931
TORSION
Elongation upon torsion in a theory for the inelastic behavior of metals
[COO-2733-1] N80-13231
TRAJECTORY ANALYSIS
Delta-Rho, a second order trajectory perturbation technique
N80-13133
A numerical solution for rocket ascent trajectory
[AD-A073346] N80-13166
TRANSFER FUNCTIONS
Analysis techniques of experimental frequency response data
N80-13497
TRANSFORMATIONS [MATHEMATICS]
Systems of frequency curves generated by transformations of logistic variables
[AD-A073481] N80-13847
TRANSFORMERS
An explicit state model of a synchronous machine - transformer - SCR bridge unit
N80-13357
Heat pipe cooled power magnetics
[NASA-CR-159659] N80-13362
Feasibility study of an active system for transformer noise abatement
[COO-4376-T1] N80-13378
TRANSIENT RESPONSE
Determining load characteristics for transient performances. Volume 3: Procedure for modeling power system loads --- mathematical model to predict transient response to overvoltage
[EPRI-EL-849-VOL-3] N80-13381
Notes on the transient responses and errors of shock accelerometers with second-order filters
[RAE-TM-IT-179] N80-13435
Transient thermal effects in disc brakes
N80-13465
TRANSMISSION LINES
Corrosion control of Hardened Intersite Cable System [HICS] splice case
[AD-A073431] N80-13219
Experimental methods for the characterization of multiconductor cable systems
[AD-A073767] N80-13366
TRANSMISSIONS [MACHINE ELEMENTS]
Impact of flywheel-transmissions on automobile performance: A logical basis for evaluation
[UCRL-52758] N80-13480
TRANSONIC WIND TUNNELS
Transonic aerodynamic characteristics of a supersonic cruise aircraft research model with the engines suspended above the wing
[NASA-TM-80145] N80-12997
TRANSPORT PROPERTIES
Isopycnal transport by the Antarctic circumpolar current and the Antarctic influence at intermediate water densities
N80-13752
Transport properties of the compositionally modulated alloy Cu/Ni
[CONF-790341-8] N80-13970
TRANSPORT THEORY
Fluidized bed flow equations --- for a two phase chemically reacting fluid and solid
[METC/CR-78/10] N80-13414
TRAPATT DEVICES
Characteristics of TRAPATT amplifiers
N80-13349
TRAPPED PARTICLES
Study of the physics of insulating films as related to the reliability of metal-oxide semiconductor devices
[AD-A073300] N80-13364
TRAPPING
Multiple-satellite observations of large scale trapping boundary motions
N80-13549
TRAVELING WAVES
Solitary wave propagation in the three-dimensional lattice
[AD-A071458] N80-13965
TREES [PLANTS]
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
TRIAXIAL STRESSES
Recommendation of a triaxial failure theory for graphite
[GA-A-15333] N80-13521
TROPICAL METEOROLOGY
Tropical disturbances in an oceanic general circulation model with seasonal forcing
[AD-A073602] N80-13756
TROPOSPHERIC SCATTERING
Estimation of the spectral moments and quadrature cross-correlation functions and their application to troposcatter systems
N80-13322
TRUCKS
Liquid hydrogen as an automotive fuel
[LA-UR-79-621] N80-13297
TUBE ANODES
Temperature and thermal stress analysis of a switching tube anode
[UCID-18049] N80-13379
TUBE HEAT EXCHANGERS
Experimental and analytical OTEC studies at ORNL
[CONF-790631-1] N80-13666
TUNABLE LASERS
Experimental evaluation of new solid state laser schemes --- tunable lasers
[AD-A073656] N80-13459
TUNGSTEN
Development of tungsten coatings for the corrosion protection of alumina-based ceramics
[CONF-790442-13] N80-13261
Experimental investigation of the absolute tunneling current density in field emission from tungsten [110]
N80-13963
TUNGSTEN OXIDES
Domain and surface structures of sodium tungsten bronzes, Na/sub x/WO3 [0.4 x 1]
[ANL-78-63] N80-13237
TUNING
Broadly tunable picosecond IR source
[LA-UR-79-1474] N80-13928
TURBINE BLADES
Characterization of an oxide dispersion strengthened superalloy, MA-6000E, for turbine blade applications --- turbine blade
[NASA-CR-159493] N80-13218
Damping properties of turbine blades
N80-13303
TURBINES
High temperature damping of dynamic systems --- dynamic stability of turbines through high temperature vibration damping
N80-13308
Induction and synchronous machines for vertical axis wind turbines
[SAND-79-7017] N80-13675
TURBOCOMPRESSORS
The performance estimation of an axial-flow compressor stage using theoretically derived blade element characteristics with experimental comparison
N80-13466

TURBOFAN ENGINES
Evaluation of airjet distortion generator used to produce steady-state, total-pressure distortion at the inlet of a General Electric F101-GE-100 turbofan engine
[AD-A072743] N80-13049
Build 2 of an accelerated mission test of a TF-41 with block 76 hardware --- investigation of structural reliability of engine parts of a turbofan engine
[AD-A073436] N80-13050
TURBOGENERATORS
Land-based application of an OTEC open-cycle power system
[CONF-790631-3] N80-13676
TURBOMACHINERY
An investigation of the efficiency of regenerative blowers and pumps
N80-13463
TURBOPROP AIRCRAFT
Advanced turbo-prop airplane interior noise reduction-source definition
[NASA-CR-159668] N80-13882
TURBULENCE
Automated prediction of boundary layer winds and turbulence for the Savannah River Laboratory
[NOAA-TR-NWS-1007-1] N80-13746
TURBULENCE METERS
Unsteady turbulence in oscillating flow
[AAAF-NT-79-11] N80-13009
TURBULENT BOUNDARY LAYER
Investigation of blown boundary layers with an improved wall jet system --- to prevent turbulent boundary layer separation
[NASA-CR-162512] N80-13004
TURBULENT FLOW
The effects of Joule heat on turbulent dispersion of temperature in high Reynolds number flow
N80-13396
A large structure model of turbulence in two- dimensional jets
N80-13398
MINT computer program for numerical computation of turbulent flow: An overview
[GA-A-15148] N80-13415
First results of a study on turbulent boundary layers in an oscillating flow with a mean adverse pressure gradient
[AAAF-NT-79-05] N80-13424
The development of a drag sensing three dimensional turbulent ball probe --- Ames 6 ft by 6 ft wind tunnel
[NASA-CR-152269] N80-13427
TURBULENT WAKES
Large scale coherent structures in the wake of axisymmetric bodies --- wind tunnel investigation
[DFVLR-FB-78-28] N80-13007
TWO DIMENSIONAL FLOW
Unsteady flow characteristics in the near wake of a two dimensional obstacle
[AAAF-NT-79-08] N80-13008
Molecular two dimensional flow of mixtures of light and heavy gases with diffuse and specular reflection
[ESA-TT-508-REV] N80-13611
TWO DIMENSIONAL JETS
Two-dimensional jet boundary interaction for submerged thermal discharges
N80-13390
A large structure model of turbulence in two- dimensional jets
N80-13398
TWO PHASE FLOW
Drag devices for two-phase mass flow measurements
[CONF-790655-5] N80-13409
Two-phase flow measurements with advanced instrumented spool pieces and local conductivity probes
[CONF-790745-1] N80-13413
Fluidized bed flow equations --- for a two phase chemically reacting fluid and solid
[METC/CR-78/10] N80-13414

U

U.S.S.R. SPACE PROGRAM
Czechoslovakian preliminary program of material research in space
N80-13095
ULTRAHIGH VACUUM
UHV-chamber: Theoretical background and facility development --- for dynamic contact experiments
N80-13086
ULTRASONIC SPECTROSCOPY
Surface-crack characterization by use of dynamic photoelastic spectroscopy
[IS-M-211] N80-13514
ULTRASONIC TESTS
Ultrasonic attenuation as an indicator of fatigue life of graphite/epoxy fiber composite
[NASA-CR-3179] N80-13488
Ultrasonic attenuation and velocity in AS/3501-6 graphite/epoxy fiber composite
[NASA-CR-3180] N80-13489
Apparatus for measurement of tissue compliance
[BMFT-FB-W-78-05] N80-13768
Relation of ultrasonic energy loss factors and constituent properties in unidirectional composites --- graphite-epoxy composite materials
[NASA-CR-3181] N80-13878
Scattering of ultrasonic waves by periodically roughened surfaces --- detection of surface erosion
[CONF-790505-17] N80-13884
ULTRAVIOLET RADIATION
Photosynthetic carbon reduction by seagrasses exposed to ultraviolet A radiation
[NASA-CR-160397] N80-13757
UNDERGROUND STORAGE
Trans-seasonal storage of solar energy: Innovative research program subtask --- underground storage
[COO-4546-3] N80-13672
Evaluation of the proposed WIPP site in Southeast New Mexico --- waste isolation pilot plant
[SAND-79-1113C] N80-13909
Technical concept for test of geologic storage of spent reactor fuel in the Climax granite, Nevada Test Site
[UCID-18197] N80-13918
UNDERWATER ACOUSTICS
Estimation of the RMS value of summed sinusoids and the application to acoustic noise measurement in shallow water
[AMTE[N]-TM-78413] N80-13885
UNITED KINGDOM
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest --- France, Italy, Germany, The United Kingdom, and the Benelux Countries
[E80-10019] N80-13598
UNITED STATES OF AMERICA
Current U. S. petroleum situation and short-term supply/demand outlook
[DOE/EIA-0184/5] N80-13607
In situ stress field in the southeastern United States and its implication
[DP-MS-78-95] N80-13733
National wind data index
[HCP/T1041-01] N80-13745
UNSTEADY FLOW
Large scale coherent structures in the wake of axisymmetric bodies --- wind tunnel investigation
[DFVLR-FB-78-28] N80-13007
Unsteady flow characteristics in the near wake of a two dimensional obstacle
[AAAF-NT-79-08] N80-13008
Unsteady turbulence in oscillating flow
[AAAF-NT-79-11] N80-13009
Investigations on unsteady pressure distribution measurements in rotating systems
[ESA-TT-503-REV] N80-13059
UNSTEADY STATE
Nonstationary analysis of the macrosegregation during the solidification in the space of the system Ge-Ga
N80-13107
UPPER SURFACE BLOWN FLAPS
Experimental study of acoustic loads on an upper-surface-blown STOL airplane configuration --- Langley full-scale wind tunnel tests
[NASA-TP-1577] N80-13879
URANIUM FLUORIDES
Experimental setup for decomposition of UF6
N80-13441
Concept for UF6-fueled self-critical DNPL reactor system
N80-13453
Laser-induced emission from uranium-hexa-fluoride
N80-13893
URBAN PLANNING
Remote sensing applied to urban and regional planning. A bibliography with abstracts
[NTIS/PS-79/0843/7] N80-13615
Energy planning with solar and conservations: Individual values and community choice
[LA-UR-79-1599] N80-13653
Federal Laboratory Consortium for Technology Transfer. Far West Region Local Government Assistance Task Force
[UCID-18037-79-2] N80-13990
USER MANUALS [COMPUTER PROGRAMS]
The Aircraft Reply and Interference Environment Simulator [ARIES]. Volume 3: Programmer's manual
[AD-A074424] N80-13017
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 2: Users manual
[NASA-CR-159692] N80-13044
USER REQUIREMENTS
Application of a tracking and Data Relay Satellite System [TDRSS] to European requirements
[BMFT-FB-W-78-37] N80-13131
UTILITIES
Requirements assessment of wind power plants in electric utility systems. Volume 3: Appendixes
[EPRI-ER-978-VOL-3] N80-13628

V

V/STOL AIRCRAFT
Force and moment data from a wind-tunnel test of a tilt-nacelle V/STOL propulsion system with an attitude control vane --- conducted in Ames 40 by 80 foot wind tunnel
[NASA-TM-81157] N80-13003
A computerized VSTOL/small platform landing dynamics investigation model
[AD-A073587] N80-13033
VACUUM FURNACES
Functional performance of the isothermal heating facility for the material science double rack
N80-13091
VACUUM MELTING
Brazing under microgravity: TEXUS 2 experiment
N80-13082
Skin technology --- and the improvement of materials microstructures
N80-13083
VALENCE
The parachor and the P yields O bond
[AD-A073410] N80-13168
VALVES
MERADCOM/OSU hydraulic system reliability program --- reliability analysis of hydraulic pumps and valves
[AD-A073789] N80-13493
VANADIUM
Delayed failure of vanadium-hydrogen alloys
[COO-3459-15] N80-13227
VANADIUM ALLOYS
Initiation and growth of fatigue microcracks and strain-controlled fatigue properties in steel alloys: Microstructure and mechanics
N80-13508
VAPOR DEPOSITION
Epitaxy at reduced temperatures
[BMFT-FB-T-78-52] N80-13980
VAPOR PHASES
Crystal growth from the vapor phase with an inert component present
N80-13075
Dispersed gaseous and solid phases in molten and solidified Cu
N80-13080
Results of French experiments on crystal growth from a vapor phase conducted on the ground as a part of the space program
N80-13116
Photochemistry of dinitrogen pentoxide
[LBL-9034] N80-13206
VAPOR PRESSURE
Physical properties of gasoline/alcohol automotive fuels
[CONF-790520-4] N80-13273
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597
VARIATIONAL PRINCIPLES
Estimation of the RMS value of summed sinusoids and the application to acoustic noise measurement in shallow water
[AMTE[N]-TM-78413] N80-13885
VARIATIONS
Effects of sound level fluctuations on annoyance caused by aircraft-flyover noise
[NASA-TP-1576] N80-13880
VECTOR CURRENTS
Vector current scattering in two dimensional quantum chromodynamics
[LBL-9022] N80-13907
VECTOR SPACES
A new weighting coefficient for adaptive state estimation
N80-13347
VEGETATION
A report on field work in the city of Paragominas [PA]
[E80-10001] N80-13587
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site --- Rhone Valley area, Avignon, France
[E80-10018] N80-13597
Beauce TELLUS project --- France
[E80-10024] N80-13600
VEHICLES
Aerodynamic characteristics of wheelchairs --- Langley V/STOL wind tunnel tests for human factors engineering
[NASA-TM-80191] N80-12999
VELOCITY DISTRIBUTION
Contributions to the Fourth Solar Wind Conference --- conference, Burghausen, West Germany, 1978
[MPI-PAE/EXTRATERR-154] N80-14008
Some characteristics of proton velocity distributions in the solar wind as observed by the Helios solar probes
N80-14011
Electron characteristics in the solar wind as deduced from Helios observations
N80-14012

VELOCITY MEASUREMENT
Horizontal two-phase flow transit time measurements
[CONF-790745-2] N80-13408
VENERA SATELLITES
The spectrophotometric experiment on board the Venera-11, Venera-12 probes: Some results from the analysis of the Venus day-sky spectrum
[D-270] N80-14004
Gas chromatograph analysis of the Venus atmosphere chemical composition on board the Venera-12 automatic interplanetary station
[D-275] N80-14007
VENUS ATMOSPHERE
The solar wind interaction with Venus
N80-13561
The spectrophotometric experiment on board the Venera-11, Venera-12 probes: Some results from the analysis of the Venus day-sky spectrum
[D-270] N80-14004
Mass spectrometer measurements of the Venus lower atmosphere composition
[D-271] N80-14005
Electrical discharges in the Venus atmosphere
[D-272] N80-14006
Gas chromatograph analysis of the Venus atmosphere chemical composition on board the Venera-12 automatic interplanetary station
[D-275] N80-14007
VENUS CLOUDS
Electrical discharges in the Venus atmosphere
[D-272] N80-14006
VERY LOW FREQUENCIES
The propagation of VLF waves through the interior of the Earth
[DRIC-TRANS-5572] N80-13345
VIBRATION
The shock and vibration digest, volume 11, number 3
[AD-A066514/1] N80-13298
The shock and vibration digest, volume 11, number 5
[AD-A069685/6] N80-13306
The shock and vibration digest, volume 11, number 2
[AD-A065807] N80-13495
Structural optimization under shock and vibration environment
N80-13496
Current methods for analyzing dynamic cable response --- vibration
N80-13500
VIBRATION DAMPING
Damping properties of turbine blades
N80-13303
The shock and vibration digest, volume 11, number 5
[AD-A069685/6] N80-13306
High temperature damping of dynamic systems --- dynamic stability of turbines through high temperature vibration damping
N80-13308
Reduction methods for problems of vibration of orthotropic plates. Part 1: Exact methods
N80-13309
The shock and vibration digest, volume 11, number 6
[AD-A070464/3] N80-13499
Reduction methods for problems of vibration of orthotropic plates. Part 2: Generalized reduction method for generally orthotropic plates with arbitrary shape
N80-13501
VIBRATION EFFECTS
The shock and vibration digest, volume 11, number 3
[AD-A066514/1] N80-13298
The shock and vibration digest, volume 11, number 4
[AD-A067426/7] N80-13302
The shock and vibration digest, volume 11, number 7
[AD-A072745/3] N80-13310
VIBRATION ISOLATORS
Damping properties of turbine blades
N80-13303
VIBRATION MODE
A review of approximate methods for determining the vibrational modes of membranes
N80-13498
VIBRATIONAL SPECTRA
Infrared absorption of spectroscopy of carbon monoxide on nickel films: A low temperature thermal detection technique
[LBL-8482] N80-13239
VIDEO COMMUNICATION
British Post Office VIEWDATA interfacing to a data communication network
[NPL-DNACS-1/78] N80-13343
VIDEO DATA
Programmable Video Digitizing System [PVDS]. Functional description and preliminary software considerations
[AD-A073756] N80-13822
VISCOELASTICITY
A theory of viscoelastic analogy for wave propagation in elastic and viscoelastic layered media
N80-13392
VISCOMETERS
Portable high-temperature, high-pressure viscometer development
[SAND-78-1409] N80-13433
VISCOPLASTICITY
Elongation upon torsion in a theory for the inelastic behavior of metals
[COO-2733-1] N80-13231
Thermoviscoplastic response of cylindrical structures using a state variable model
[COO-2733-19] N80-13516
VISCOSITY
Temperature dependence of the viscosity of some crude oils and pure liquids
N80-13182
VISCOUS DAMPING
On the optimization of spring elasticity, damping, and inertia effects on the spring loading of a control stick
[FB-37] N80-13776
VISCOUS FLOW
Three-dimensional viscous hypersonic flows over general bodies using shock-layer and parabolized Navier-Stokes equations
N80-12993
Impulsive penetration and viscous interaction
N80-13577
VISCOUS FLUIDS
Experiments on the stability of conical and cylindrical liquid columns at low Bond numbers
N80-13110
VISUAL PERCEPTION
A field of view simulator equipped for perspective transformation on a television raster
[FB-34] N80-13775
VITREOUS MATERIALS
Structures, spectra and related properties of titanium-, zirconium-, and hafnium-doped vitreous silica
N80-13245
VOLTAGE CONVERTERS [DC TO DC]
Performance of 22.4-kW nonlaminated-frame dc series motor with chopper controller --- a dc to dc voltage converter
[NASA-TM-79252] N80-13361
VOLTERRA EQUATIONS
Detection and MMSE estimation of nonlinear memoryless functionals of random processes using the Volterra functional expansion
N80-13355
VOLUME
The parachor and the P yields O bond
[AD-A073410] N80-13168
VORTEX RINGS
A study of the dissipative mechanism in the flow of superfluid helium-4 using charged vortex rings
N80-13314
VORTEX SHEETS
The scattering of sound by a region of fluid in solid body rotation at low Mach number
[RAE-TR-78100] N80-13886
VORTICES
Inclusion of unsteady aerodynamics in longitudinal parameter estimation from flight data --- use of vortices and mathematical models for parameterization from flight characteristics
[NASA-TP-1536] N80-12995
A study of the dissipative mechanism in the flow of superfluid helium-4 using charged vortex rings
N80-13314
The importance of eddy momentum flux in the dynamics of a hurricane: A numerical approach
N80-13741

W

WALL FLOW
Effects of wall waviness and nonlinear wave interactions on the stability of boundary-layer flows
N80-12992
WALL JETS
Investigation of blown boundary layers with an improved wall jet system --- to prevent turbulent boundary layer separation
[NASA-CR-162512] N80-13004
Investigation of blown boundary layers with an improved wall jet stream
N80-13400
WALLS
Thermal performance of buildings and building envelope systems: An annotated bibliography
[LBL-8925] N80-13680
WARNING SYSTEMS
PAVE PAWS modern programming data collection system
[AD-A073357] N80-13984
WASHINGTON
Digital processing of LANDSAT MSS and topographic data to improve capabilities for computerized mapping of forest cover types --- Colorado and Washington
[E80-10009] N80-13588
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
WASTE DISPOSAL
Conceptual design study of a concrete canister spent-fuel storage facility
[AECL-6301] N80-13902
Spent fuel receipt and lag storage facility for the spent fuel handling and packaging program --- structural design criteria for light waste water disposal storage
[DPSTD-SFHP-78-10] N80-13905
Evaluation of the proposed WIPP site in Southeast New Mexico --- waste isolation pilot plant
[SAND-79-1113C] N80-13909
Technical concept for test of geologic storage of spent reactor fuel in the Climax granite, Nevada Test Site
[UCID-18197] N80-13918
Heat transfer in high-level waste management
[CONF-790822-1] N80-13919
Retrievable storage concept designs
[UCRL-15018] N80-13920
A technical and economic evaluation of the project in Baltimore, Maryland, volume 2 --- waste processing plant
[PB-297871/6] N80-13991
A technical and economic evaluation of the project in Baltimore, Maryland, Volume 3 --- waste processing plant
[PB-297872/4] N80-13992
A technical and economic evaluation of the project in Baltimore, Maryland, volume 4 --- waste processing plant
[PB-297873/2] N80-13993
WASTE ENERGY UTILIZATION
Land-based application of an OTEC open-cycle power system
[CONF-790631-3] N80-13676
Conceptual designs for two reject heat systems for a Brayton closed-cycle converter
[LA-7821-MS] N80-13677
Cogeneration opportunities --- conferences
[CONF-7806118] N80-13681
WASTE TREATMENT
US program for the immobilization of high-level nuclear wastes
[DP-MS-79-2] N80-13917
WASTE UTILIZATION
Gasification of residual materials from coal liquefaction
[FE-2247-22] N80-13289
Characterization of solid-waste conversion and cogeneration systems
[LBL-7883] N80-13648
WASTE WATER
Spent fuel receipt and lag storage facility for the spent fuel handling and packaging program --- structural design criteria for light waste water disposal storage
[DPSTD-SFHP-78-10] N80-13905
WATER
Experimental investigations of nonequilibrium flashing of water in a converging-diverging nozzle
[BNL-NUREG-25716] N80-13417
WATER BALANCE
Analysis of metabolic energy utilization in the Skylab astronauts
[NASA-CR-160402] N80-13770
Skylab water balance error analysis
[NASA-CR-160403] N80-13771
WATER DEPTH
Long water wave propagation under the influence of the depth variation. Part 1: Long water waves incident upon a transition zone of an exponential depth variation. Part 2: Long water waves incident upon a seamount model of a linearly cylindrical depth variation
N80-13584
WATER FLOW
Pitot tube and drag body measurements in transient steam-water flows
[CONF-790505-15] N80-13416
WATER HEATING
Multi-use geothermal energy system with augmentation for enhanced utilization. Non-electric application of geothermal energy in Susanville, California
[DOE/ET-248447/1] N80-13660
WATER POLLUTION
Remote sensing applied to environmental pollution detection and management. A bibliography with abstracts
[NTIS/PS-79/0842/9] N80-13614
WATER QUALITY
Guidelines for multimedia environmental monitoring of Department of Energy fossil energy RD and D facilities
[FE-2495-T13-VOL-2] N80-13724
WATER RESOURCES
Space Observations for water resources: A potential to be developed
N80-13609
WATER VAPOR
Warm/cold cloud processes
[NASA-CR-161336] N80-13743
WATER WAVES
Long water wave propagation under the influence of the depth variation. Part 1: Long water waves incident upon a transition zone of an exponential depth variation. Part 2: Long water waves incident

upon a seamount model of a linearly cylindrical depth variation
N80-13584
The ocean tide and waves beneath the Ross Ice Shelf, Antarctica
N80-13751

WAVE ATTENUATION
Ultrasonic attenuation as an indicator of fatigue life of graphite/epoxy fiber composite
[NASA-CR-3179] N80-13488
Relation of ultrasonic energy loss factors and constituent properties in unidirectional composites --- graphite-epoxy composite materials
[NASA-CR-3181] N80-13878

WAVE FUNCTIONS
Dominant partition method --- based on a wave function formalism
[NASA-TM-80778] N80-13851

WAVE GENERATION
Generation and control of a slow space charge wave on a high current electron beam and its potential as a collective ion accelerator
N80-13900

WAVE INTERACTION
Effects of wall waviness and nonlinear wave interactions on the stability of boundary-layer flows
N80-12992

WAVE PROPAGATION
The propagation of VLF waves through the interior of the Earth
[DRIC-TRANS-5572] N80-13345
A theory of viscoelastic analogy for wave propagation in elastic and viscoelastic layered media
N80-13392
Critical level behavior of ion-cyclotron waves at magnetospheric boundary layers
N80-13542
Long water wave propagation under the influence of the depth variation. Part 1: Long water waves incident upon a transition zone of an exponential depth variation. Part 2: Long water waves incident upon a seamount model of a linearly cylindrical depth variation
N80-13584
A theory for the asymmetry in the auroral ionization density profile for the generation of auroral infrasonic waves
N80-13729
Solitary wave propagation in the three-dimensional lattice
[AD-A071458] N80-13965

WAVE REFLECTION
Reflected blast measurements at small scaled distances for M26E1 propellant
[AD-A073409] N80-13269

WAVEGUIDES
A study of a reactively loaded finite planar rectangular waveguide antenna array
N80-13324
GaAs waveguide detector array for an IOC spectrum analyzer
[AD-A073552] N80-13924

WAVELENGTHS
Long water wave propagation under the influence of the depth variation. Part 1: Long water waves incident upon a transition zone of an exponential depth variation. Part 2: Long water waves incident upon a seamount model of a linearly cylindrical depth variation
N80-13584

WEAR TESTS
Wear, friction, and temperature characteristics of an aircraft tire undergoing braking and cornering
[NASA-TP-1569] N80-13013
Investigation of advanced prognostic analysis techniques --- failure analysis and wear tests of mechanical drive gears
[AD-A073553] N80-13032

WEATHER FORECASTING
Automated prediction of boundary layer winds and turbulence for the Savannah River Laboratory
[NOAA-TR-NWS-1007-1] N80-13746

WEATHER STATIONS
Meteorological observations in the Netherlands for 1977
[KNMI-97-129] N80-13750

WEIBULL DENSITY FUNCTIONS
Statistical analysis of finite mixtures of exponential and Weibull distributions
N80-13857
A density-quantile function approach to choosing order statistics for the estimation of location and scale parameters
[AD-A073270] N80-13866

WEIGHT INDICATORS
Industrial trial run of the AVA derivative balance on an Alphajet jet model in a 3 m windtunnel
[BMFT-FB-W-78-07] N80-13060

WEIGHTING FUNCTIONS
A new weighting coefficient for adaptive state estimation
N80-13347

WEIGHTLESSNESS
Structural and physical characteristics of InSb single crystals grown under near-zero gravity conditions
N80-13071
Fundamental and applied aspects of fluid physics under microgravity
N80-13103
Experiment performance under zero-G using Small Self-Contained Payloads [SSCP] and other automatic equipment
N80-13122
Manufacturing of oxide glasses. Critical comment on proposals for melting and solidification experiments under zero-g conditions
[BMFT-FB-W-78-06] N80-13127
Marangoni bubble motion in zero gravity --- Lewis zero gravity drop tower
[NASA-TM-79250] N80-13403
Combustion of solid carbon rods in zero and normal gravity
[NASA-TM-79303] N80-13404
Development of a mass transfer machine for gas/liquid operations in the absence of gravity
[BMFT-FB-W-78-20] N80-13420

WEIGHTLESSNESS SIMULATION
Numerical and experimental simulation of microgravity-convection
N80-13112

WELDING
Elevated temperature exposure has significant effects on the structure of austenitic stainless steel welds
[CONF-790736-1] N80-13232
Data acquisition system for the Hamilton Standard W2 electron beam welder
[SAND-79-8014] N80-13482

WELLS
Geothermal energy. Part 1: Exploration, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0814/8] N80-13715

WETLANDS
Wetland values concepts and methods wetlands evaluation
[AD-A069088] N80-13602

WHEAT
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization --- North Dakota, Oklahoma, Montana, Colorado, and Minnesota
[E80-10015] N80-13594
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains --- Colorado, Oklahoma, South Dakota, Minnesota, Montana, North Dakota, Kansas, Nebraska, Texas
[E80-10016] N80-13595

WHEELS
Aerodynamic characteristics of wheelchairs --- Langley V/STOL wind tunnel tests for human factors engineering
[NASA-TM-80191] N80-12999

WIDEBAND COMMUNICATION
Estimation of the spectral moments and quadrature cross-correlation functions and their application to troposcatter systems
N80-13322

WIND [METEOROLOGY]
National wind data index
[HCP/T1041-01] N80-13745
Solar-climactic statistical study --- windpower utilization and solar energy conversion
[HCP/T4016-01/2] N80-13747

WIND EFFECTS
Wind excited behavior of structures, 2
N80-13305

WIND MEASUREMENT
A compilation of moored current meter and wind recorder data. Volume 18: JASIN 1978, Moorings 651-653
[AD-A073581] N80-13755

WIND PROFILES
Modified power law equations for vertical wind profiles
[NASA-TM-79275] N80-13623

WIND SHEAR
Jet transport performance in thunderstorm wind shear conditions
[NASA-CR-3207] N80-13742
Tropical disturbances in an oceanic general circulation model with seasonal forcing
[AD-A073602] N80-13756

WIND TUNNEL APPARATUS
Industrial trial run of the AVA derivative balance on an Alphajet jet model in a 3 m windtunnel
[BMFT-FB-W-78-07] N80-13060

WIND TUNNEL MODELS
Some measurements of buffeting on an aeroelastic model of a slender wing aircraft
[RAE-TM-STRUCT-942] N80-13055
Instrument error analysis as it applies to windtunnel testing
[NASA-TP-1572] N80-13430

WIND TUNNEL TESTS
Aerodynamic characteristics of wheelchairs --- Langley V/STOL wind tunnel tests for human factors engineering
[NASA-TM-80191] N80-12999
Supersonic stability and control characteristics of a cruciform missile model with delta wings and aft tail fin control --- Langley unitary plan wind tunnel tests
[NASA-TM-80171] N80-13000
Force and moment data from a wind-tunnel test of a tilt-nacelle V/STOL propulsion system with an attitude control vane --- conducted in Ames 40 by 80 foot wind tunnel
[NASA-TM-81157] N80-13003
Unsteady turbulence in oscillating flow
[AAAF-NT-79-11] N80-13009
A-10 carriage loads test
[AD-A073442] N80-13034
Some measurements of buffeting on an aeroelastic model of a slender wing aircraft
[RAE-TM-STRUCT-942] N80-13055
The development of active control and its application to flutter suppressors --- wind tunnel test results
[AAAF-NT-79-02] N80-13056
Instrument error analysis as it applies to windtunnel testing
[NASA-TP-1572] N80-13430
Experimental study of acoustic loads on an upper-surface-blown STOL airplane configuration --- Langley full-scale wind tunnel tests
[NASA-TP-1577] N80-13879

WIND VELOCITY
Beauce TELLUS project --- France
[E80-10024] N80-13600

WIND VELOCITY MEASUREMENT
Air flow measurements in a large irregularly shaped tunnel using anemometer and pitot-static tube traverse
[NEL-660] N80-13061

WINDPOWER UTILIZATION
Modified power law equations for vertical wind profiles
[NASA-TM-79275] N80-13623
Requirements assessment of wind power plants in electric utility systems. Volume 3: Appendixes
[EPRI-ER-978-VOL-3] N80-13628
Wind energy innovative systems
[SERI/PR-13-054] N80-13674
Induction and synchronous machines for vertical axis wind turbines
[SAND-79-7017] N80-13675
Environmental development plan: Wind energy conversion
[DOE/EDP-0030] N80-13701
Solar-climactic statistical study --- windpower utilization and solar energy conversion
[HCP/T4016-01/2] N80-13747

WINDPOWERED GENERATORS
Modified aerospace reliability and quality assurance method for wind turbines
[NASA-TM-79284] N80-13490
Requirements assessment of wind power plants in electric utility systems. Volume 3: Appendixes
[EPRI-ER-978-VOL-3] N80-13628
Wind energy innovative systems
[SERI/PR-13-054] N80-13674
Induction and synchronous machines for vertical axis wind turbines
[SAND-79-7017] N80-13675

WING NACELLE CONFIGURATIONS
Assessment at full scale of exhaust nozzle to wing size on STOL-OTW acoustic characteristics
[NASA-TM-79279] N80-13881

WING PROFILES
Exploratory study of the effects of wing-leading-edge modifications on the stall/spin behavior of a light general aviation airplane
[NASA-TP-1589] N80-13026
Active flutter control for flexible vehicles, volume 1
[NASA-CR-159160] N80-13053

WING TANKS
Temperature and flow measurements on near-freezing aviation fuels in a wing-tank model
[NASA-TM-79285] N80-13268

WOOD
Evaluation of polar and non-polar plastics compounded with thermomechanical wood fibers
N80-13247

X

X RAY ABSORPTION
Determining biological fine structure by differential absorption of soft X-ray
[BNL-26282] N80-13760

X RAY ANALYSIS
X-ray measurement of carbon-caused atomic displacements in Fe-Ni-C martensite
N80-13217
Electron microprobe analysis of tantalum-nitride thin films
[BDX-613-1198-REV] N80-13967

Comparison of procedures for quantitative X-ray analysis in thin films
[BNL-25759] N80-13979

X RAY DENSITY MEASUREMENT
X-ray and gamma ray transmission densitometry
[CONF-790692-1] N80-13910

X RAY SCATTERING
Measurement of the inelastic x-ray scattering cross section of neon with synchroton radiation
N80-13889
Determination of the intensity of scattered radiation and the performance of grids in diagnostic radiology by Monte Carlo methods
N80-13921

X RAY SOURCES
Anti-Stokes emission as a VUV and soft X-ray source
[NASA-CR-162266] N80-13923
Iron line emission from the Alfven shell in X-ray binaries
[PR-450] N80-13998

X RAY SPECTRA
Compton shift of X-rays in plasma clouds: Typical radiation spectra
[PR-441] N80-14000

X RAY SPECTROSCOPY
Optimization of an analytical electron microscope for X-ray microanalysis: Instrumental problems
[CONF-790418-6] N80-13432

X RAYS
A theoretical investigation of the electronic band structure and bulk properties of diamond
N80-13953

XENON
Fast opening switches carrying multimegampere currents and their application to high velocity shock waves in xenon
[UCRL-82134] N80-13385

XENON COMPOUNDS
Spectral emission of nuclear excited XeBr*
N80-13443

XYLENE
Formation of block polymers involving poly-[P-xylelene] blocks
N80-13251

Y

YAG LASERS
Experimental evaluation of new solid state laser schemes --- tunable lasers
[AD-A073656] N80-13459

YAW
Experimental study of heat transfer from a yawed cylinder to air with a constant wall heat flux
[SAND-79-8022] N80-13005

YIELD
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites --- Great Plains Corridor, North America
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model --- Wheat growth in the Great Plains Corridor, North America
[E80-10011] N80-13590

YTTRIUM-IRON GARNET
An experimental and theoretical investigation of magnetic ordering in Yttrium Iron Garnet --- raman lasers backscattering
N80-13946

Z

ZEOLITES
Application of synthetic molecular sieve zeolites and silica gel toward the separation of sulfur dioxide from combustion gases
N80-13180

ZERO ANGLE OF ATTACK
Assessment of a method for predicting the drag and boundary layer development on a body of revolution at zero incidence
[AMTE[N]-R-78111] N80-13006

ZINC
Assessment of technical and economic feasibility of zinc/bromine batteries for utility load leveling
[EPRI-EM-1059] N80-13659

ZIRCONATES
Lead zirconate titanate [LZT] ceramics
[AD-A073564] N80-13259

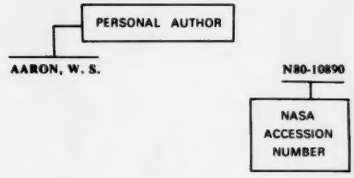
ZIRCONIUM
Structures, spectra and related properties of titanium-, zirconium-, and hafnium-doped vitreous silica
N80-13245

ZIRCONIUM ALLOYS
Analytical electron microscope study of the omega phase transformation in a zirconium-nobium alloy
[ORNL/TM-6705] N80-13240

ZONE MELTING
Floating zone stability [exp. 1-ES-331] --- on board Spacelab
N80-13078
Contributions to Marangoni convection in cylindric melting zones: Experimental simulation and calculation of the influence of gravity
[BMFT-FB-W-78-39] N80-13421

PERSONAL AUTHOR INDEX

Typical Personal Author Index Listing



Listings in this Index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

ABBIN, J. P., JR. N80-13693
ABDEL-HAMID, T. K. N80-13792
ABUAF, N. N80-13417
ABUL-HAMAYEL, M. A. N80-13393
ACKERSON, K. L. N80-13546
ADAMS, R. O. N80-13626
ADAMY, S. N80-13069
ADLAKHA, V. G. N80-13842
N80-13843
ADLHART, O. N80-13625
ADORNI, N. N80-13086
ADUR, A. M. N80-13249
AGIN, G. J. N80-13603
AGRAWAL, A. K. N80-13366
AHARONYAN, P. N80-13621
AHRABI, F. N80-13845
AIELLO, G. A. N80-13399
AIHARA, K. N80-13383
AITKEN, J. M. N80-13364
AKERS, J. W. N80-13815
ALADIEV, S. I. N80-13075
ALEXANDER, G. N80-13688
ALFVEN, H. N80-13531
ALLAN, J. N80-13061
ALLEY, W. E. N80-13895
ALLISON, S. W. N80-13893
ALMUALA, B. C. N80-13285
ALPERIN, M. N80-13051
AMATA, E. N80-13548
AMIN, M. B. N80-13182
AMOS, D. E. N80-13419
AN, C. H. N80-13935
ANDEEN, C. N80-13458
ANDERSON, J. L. N80-13409
ANDERSON, K. A. N80-13547
ANDERSON, T. W. N80-13865
ANTONA, P. L. N80-13084
ANZER, U. N80-13562
N80-13563
ARBINGER, H. N80-13132
ARDEMA, M. D. N80-12991
ARENDT, R. H. N80-13259
ARMIJO, J. R. N80-13684
ARNOLD, R. G. N80-13903
ARNOLD, S. J. N80-13454
ARONS, J. N80-13565
ARONS, R. M. N80-13261
N80-13483
ARRAGON, P. N80-13107
ARVIZU, D. E. N80-13642
ASARO, R. J. N80-13229
ASKEW, A. J. N80-13609
ATKINS, D. J. N80-13006
ATOJI, M. N80-13237
ATWOOD, M. E. N80-13821
AULEYTNER, J. N80-13076
AVRAAMOV, Y. S. N80-13074
AYERS, J. D. N80-13456

B

BACH, M. N80-13782
BAILEY, R. B. N80-13239
BAIN, J. A., JR. N80-13836
BAK, J. N80-13076
BAKER, A. G. N80-13408
BAKERM, W. E. N80-13313
BALAKRISHNA, S. N80-13058
BALDWIN, A. R. N80-13684
BALLOU, L. B. N80-13918
BANDYOPADHYAY, G. N80-13683
BARBIERI, F. N80-13080
BARGER, R. L. N80-13001
BARKLAGE-HILGEFORT, H. J. N80-13101
BARMAN, N. C. N80-13470
BARNEY, D. L. N80-13685
BARROW, H. G. N80-13603
BARTA, C. N80-13095
N80-13096
BARTHOLOMEW, P. N80-13527
BASKO, M. M. N80-13998
BASS, B. R. N80-13407
BASSOUS, E. N80-13364
BATES, J. B. N80-13265
N80-13977
N80-13978
BATHKE, W. N80-13082
BATTEH, J. H. N80-13965
BATTLES, J. E. N80-13682
BATTRICK, B. N80-13529
BAXTER, B. S. N80-13996
BAYLES, R. A. N80-13950
BEARD, J. T. N80-13671
BEATTIE, J. R. N80-13158
BEAUFRERE, A. H. N80-13632
BECHTEL, J. H. N80-13204
BECHTOLD, R. L. N80-13274
N80-13276
BECKER, E. E. N80-13042
BECKER, W. N80-13736
BEDAIR, S. M. N80-13661
BEECY, D. N80-13286
BEGHIN, C. N80-13738
BELLAH, J. L. N80-13260
BENNER-DRURY, D. L. N80-13660
BENNETT, G. A. N80-13677
BENSCH, R. R. N80-13742
BENTLEY, J. N80-13432
BENZ, K. W. N80-13117
BERGLES, A. E. N80-13707
BERMAN, I. N80-13698
BERTHIER, J. N80-13124
BERTOLACINI, R. J. N80-13292
BERTSEKAS, D. P. N80-13338
BETHMANN, A. N80-13344
BETZINA, M. D. N80-13003
BEWERSDOFF, A. N80-13109
BIBEE, L. D. N80-13727
BICKEL, T. C. N80-13272
BIEBER, J. W. N80-13544
BIERNAT, H. N80-13569
BIHUBUAK, P. P. N80-13245
BILLIMORIA, R. N80-13181
BINDER, A. E. N80-13375
BINDER, G. N80-13009
BIRK, A. N80-13271
BISHOP, M. N80-13791
BISHOP, M. J., JR. N80-13840
BITTERLICH, W. N80-13345
BITTKER, D. A. N80-13721
BLACK, J. E. N80-13905
BLICK, E. F. N80-13742
BLINT, R. J. N80-13204
BOCCHI, W. J. N80-13336
BOCHAROV, D. V. N80-13070
BOERNER, G. N80-13562
N80-13563
BOHNHOFF, K. N80-13128
BOINODIRIS, S. N80-13801
BOLLER, H. E. N80-13777
BOLLES, R. C. N80-13603
BONNER, E. N80-12998
BOOTH, R. W. D. N80-13360
BORDER, J. S. N80-13837
BORMAN, K. L. N80-13753
BOROVIKOVA, R. P. N80-13076
BOWDLE, D. A. N80-13743
BOWLES, K. J. N80-13171
BOX, S. N80-13685
BOZATI, A. N. N80-12992
BRADSHAW, M. H. N80-13761
BRADSHAW, T. N80-13638
BRAMANTI, A. N80-13386
BRANDEBERRY, J. E. N80-13790
BRATIS, J. C. N80-13636
BRAUER, H. N80-13420
BRAUN, H. M. N80-13131
BRAUN, P. D. N80-13980
BRAY, R. E. N80-13747
BREINIG, M. N80-13888
BRESEE, R. R. N80-13246
BRISCOE, M. G. N80-13755
BRITTINGHAM, J. N. N80-13341
BROEHL, J. H. N80-13688
BROEMER, H. N80-13127
BROOKMAN, B. J., JR. N80-13465
BROOKS, B. M. N80-13882
BROOKS, R. D. N80-13936
BROUGH, W. G. N80-13918
BROWN, D. J. N80-13121
BROWN, G. M. N80-13977
BROWN, G. W. N80-13146
BROWN, I. M. N80-13173
BROWN, L. R. N80-13754
BROWN, M. C. N80-13673
BROWN, M. L., JR. N80-13596
BROWN, N. E. N80-13064
N80-13065
BROWN, P. F. N80-13475
BROWN, P. W. N80-13667
BROWNLOW, J. D. N80-13863
BRUECKNER, R. N80-13102
BRUNDAGE, W. E. N80-13977
BRYCE, W. D. N80-13887
BUCK, W. L. N80-13689
BUCKNER, A. T. N80-13374
BUCY, R. S. N80-13817
BUGLIA, J. J. N80-13730
BURGER, C. P. N80-13514
BURKE, G. J. N80-13341
BURNETT, L. J. N80-13205
BURNS, E. J. T. N80-13901
BURTON, T. E. N80-13415
BUTKOVICH, T. R. N80-13918
BUTLER, G. D. N80-13607
BUZZARD, R. J. N80-13513
BYROADE, A. N80-13125

C

CADARS, J. N80-13093
CADORET, R. N80-13116
CADY, W. E. N80-13374
CAIN, J. N80-13132
CAIRO, L. N80-13567
CALM, J. M. N80-13706
CAMBURN, G. L. N80-13196
CAMPBELL, J. D. N80-13241
CAMPILLO, A. J. N80-13928
CANDIDI, M. N80-13548
CANONICO, D. A. N80-13522
CARDEN, H. D. N80-13025
CARETTA, R. A. N80-13183
CAREY, B. S. N80-13394
CARLBERG, T. N80-13097
N80-13098
CARLEY, J. F. N80-13263
CARLSON, R. C. N80-13918
CARLSON, R. E. N80-13852
CARMICHAEL, D. C. N80-13688
CARNE, T. G. N80-13176
CARPENTER, R. W. N80-13432
CARR, P. C. N80-13002
CARROLL, W. L. N80-13680
CARSON, G. T., JR. N80-12997
CARTER, B. D. N80-13442
CASTELLANI, L. N80-13080
CATON, P. D. N80-13081
CAVENY, L. H. N80-13271
CEOLA, K. N80-13368
CERONETTI, G. N80-13087
CESAR, C. L. N80-13802
CHAHAL, J. S. N80-13873

CHAKRAVARTY, S. N80-13968
CHALLA, M. N80-13741
CHAMBERLAIN, J. N80-13203
CHANDLER, R. F. N80-13014
CHANG, K. C. N80-13964
CHANGEART, F. J. N80-13093
CHANGERY, M. J. N80-13745
CHEFFIN, R. E. N80-13590
CHEMILEWSKI, M. A. N80-13855
CHEN, C. R. N80-13722
CHEN, F. C. N80-13676
CHEN, J. M. N80-13277
CHEN, K. C. N80-13398
CHEN, K. C. S. N80-13316
CHEN, M. S. N80-13381
CHEN, P. C. N80-13217
CHEN, S. H. R. N80-13228
CHEN, Y. L. N80-13510
CHENG, D. Y. N80-13427
CHESTER, M. S. N80-13362
CHEVERTON, R. D. N80-13524
CHHIKARA, R. S. N80-13595
CHILENSKAS, A. A. N80-13685
CHIOU, H. D. N80-13214
CHISHOLM, D. N80-13422
CHOI, K. W. N80-13641
CHOI, S. I. N80-13265
CHOU, T. J. N80-13320
CHRISTODOULIDIS, D. N80-13583
CHUN, C. H. N80-13104
N80-13421
CHUNG, D. W. N80-13227
CLANCY, P. F. N80-13088
CLEVENSON, S. A. N80-13769
CLEVER, W. N80-12998
CLINTON, N. J. N80-13594
COATES, R. N80-13633
COE, P. L., JR. N80-12999
COENEN, H. N80-13207
COHEN, D. K. N80-13235
COHEN, M. N80-13222
COLETTI, R. J. N80-13174
COLLOFELLO, J. S. N80-13806
COMSTOCK, G. M. N80-14003
CONNELL, P. S. N80-13206
COOK, R. B. N80-13342
COOK, W. A. N80-13515
COPELAND, R. J. N80-13669
COPLEY, J. C. N80-13055
COPPOLA, A. N80-13491
CORIELL, S. R. N80-13077
CORLETT, W. A. N80-13000
CORONITI, F. N80-13547
CORSON, R. W. N80-13134
CORTELAZZI, G. N80-13086
COSTA, N. N80-13080
COURANT, E. D. N80-13916
COUSTEIX, J. N80-13423
N80-13424
COWLEY, S. W. H. N80-13572
COX, F. W. N80-13273
COX, K. E. N80-13296
CRAMB, A. W. N80-13215
CRAMER, R. N80-13772
CRANDALL, J. L. N80-13917
CROLEY, D. R., JR. N80-13540
CROOKER, N. U. N80-13573
CROSSMAN, F. W. N80-13170
CROUSE, R. S. N80-13522
CRUM, L. A. N80-13790
CUMMINGS, I. M. N80-13983
CUNNINGTON, G. R. N80-13660
CURRAN, D. R. N80-13172

D

DACUS, M. W. N80-13416
DAHLBERG, L. N80-13528
DALY, P. W. N80-13545
DANG, V. D. N80-13294
DAO, K. C. N80-13172
DARIVA, I. N80-13078
DAROLIA, R. N80-13474
DASGUPTA, C. N80-13968
DAVENPORT, C. M. N80-13380
DAVIDSON, C. R. N80-13620
DAVIE, N. T. N80-13479
DAVIES, A. T. N80-13343
DAVIS, A. N80-13636
DAVIS, C. E. N80-13413
DAVIS, R. E. N80-13799
DAWES, W. R., JR. N80-13382
DAWS, J. W. N80-13471
DAWSON, D. B. N80-13224
DEALMEIDA, C. E. V. N80-13898
DEASON, V. A. N80-13416
DECHIARO, L. F. N80-13946
DECHRISTOFARO, N. N80-13221
DEE, R. N80-13970
DEGNAN, J. J., III N80-13437
DEJESUSPARADA, N. N80-13587
DELANO, C. B. N80-13257
DELOLLIS, N. J. N80-13262
DELUCA, W. H. N80-13685
DEMORAESNOVO, E. M. L. N80-13587
DEMPSEY, D. J. N80-13753
DEMUTH, O. J. N80-13627
DENNEHY, G. N80-13651
DENNING, P. J. N80-13789
DENNIS, T. B. N80-13591
DESCHAMPS, P. Y. N80-13739
DESERNO, B. N80-13123
DESSLER, A. J. N80-13559
DESTUYNDER, R. N80-13056
DEUTSCHER, K. N80-13127
DEWITT, K. J. N80-13403
N80-13404
DEYOUNG, R. J. N80-13446
DICKERSON, L. S. N80-13295
DICKEY, B. R. N80-13919
DIMARIA, D. J. N80-13364
DINULESCU, H. A. N80-13358
DIRECTOR, B. N80-13897
DIXON, R. D. N80-13790
DIXON, R. M. N80-13851
DJADOUN, S. N80-13250
DOBEK, L. J. N80-13475
DOCTOR, P. G. N80-13883
DODDS, W. J. N80-13048
DOLL, B. N80-13488
DONGES, E. N80-13779
DONOVAN, J. J. N80-13792
DORN, D. N80-13638
DOSS, E. D. N80-13937
DOSSANTOS, A. P. N80-13587
DRAGT, A. J. N80-13913
DRUGAN, W. J. N80-13517
DUARTE, V. N80-13587
DUBE, R. P. N80-13825
DUBIN, R. R. N80-13978
DUDLEY, V. E. N80-13645
DUFFIELD, R. B. N80-13673
DUM, C. T. N80-14008
N80-14009
DUNBAR, J. N80-13772
DUNCAN, D. A. N80-13280
DUNCAN, J. E. N80-13918
DUNCAN, P. J. D. N80-13422
DUNN, K. N80-12998
DUSEK, J. T. N80-13261
N80-13683
DUTTA, S. N80-13254
DWYER, C. N80-13607
DYMENT, A. N80-13008

E

EASTON, C. R. N80-13700
EATHER, R. H. N80-13555
EATON, L. E. N80-13822
EDESKUTY, F. J. N80-13690
EDMONDS, D. P. N80-13232
EDWARDS, G. W. N80-13276
EHRLICH, C. D. N80-13963
EISSENBERG, D. M. N80-13631
EKONOMOV, A. P. N80-14004
ELHAKEEM, A. K. N80-13329
ELLINGSON, W. A. N80-13884
ELLIS, C. J. N80-13805
ELLIS, H. W. N80-13457
ELNEWEIHI, E. N80-13492
ELPHIC, R. C. N80-13534
N80-13561
ENG, K. Y. N80-13321
ENGLISH, T. C. N80-13925
ENGSTROM, H. N80-13265
N80-13977
ENSLEY, D. L. N80-13942
N80-13943
EPSTEIN, B. N80-13844
ERBEN, E. N80-13083
ESPARZA, E. D. N80-13269
ESTREICH, D. B. N80-13369
N80-13382
EUBANK, R. L. N80-13866
EVANS, D. N80-14015
EYB, M. N80-13089
EYER, A. N80-13079

F

FABRICIUS, U. N80-13387
FAELTHAMMAR, C. G. N80-13535
FAHLESON, U. V. N80-13535
FAILS, A. M. N80-13596
FAIRFIELD, D. H. N80-13530
FALCO, C. M. N80-13970
FAN, C. Y. N80-13132
FANUCCI, J. B. N80-13414
FARAHAT, M. K. N80-13685
FARBER, P. S. N80-13689
FARRELL, K. N80-13971
FARRELL, R. M. N80-13828
FARROW, R. L. N80-13356
FAUST, D. N80-13123
FAVIER, J. J. N80-13106
N80-13107
FAVRE-MARINET, M. N80-13009
FENNELL, J. F. N80-13540
FEWELL, L. L. N80-13255
FILIPPOV, G. F. N80-14006
FINCKE, J. R. N80-13416
FISCHER, J. N80-13205
FISCHLER, M. A. N80-13603
FISHER, D. M. N80-13513
FISHER, R. N80-13342
FISHMAN, G. S. N80-13842
N80-13843
FISK, L. A. N80-13132
FLANNERY, M. R. N80-13457
FLECK, J. A., JR. N80-13461
FLEISHON, N. L. N80-13907
FOLEY, H. N80-13203
FORTNER, R. J. N80-13894
FORTSON, N. N80-13203
FOSTER, K. D. N80-13454
FOWLE, A. A. N80-13110
FOWLER, R. H. N80-13944
FOWLES, H. M. N80-13366
FRAIKOR, F. J. N80-13626
FRANK, L. A. N80-13546
FRANK, P. D. N80-13804
FRANKE, B. N80-13092
FRANSES, E. I. N80-13395
FREDRIKSSON, H. N80-13098
FREEMAN, D. C., JR. N80-13052
FREEMAN, J. R. N80-13876
FREEMAN, J. W. N80-13574
FRENCH, R. H. N80-13337
FRIEDMAN, R. N80-13268
FRIELER, K. N80-13082
FRISCH, H. P. N80-13150
FRISCHAT, G. H. N80-13101
FRITSCH, F. N. N80-13852
FRITTS, E. N80-13125
FRITZ, J. N. N80-13875
FRITZ, T. A. N80-13549
FRITZSCHE, A. E. N80-13606
FROST, R. L. N80-13994
N80-13996
FUCHS, H. V. N80-13007
FUNDERLIC, R. E. N80-13849

G

GAEBELEIN, W. N80-13420
GAJDA, W. J. N80-13175
GALAUP, C. N80-13118
GALAZKA, R. R. N80-13076
GALEEV, A. N80-13539
GALLANTI, G. N80-13386
GALLO, P. N80-13286
GALLOWAY, L. N80-13188
GALVIN, T. M. N80-13683
GAMMEL, G. M. N80-13900
GANGADHARAN, A. C. N80-13698
GANPANTZEROVA, O. F. N80-14006
GARBIN, H. D. N80-13732
GARDINER, G. N80-13318
GARDY, K. N80-13090
GARLAND, B. J. N80-13148
GARRARD, W. L. N80-13053
GARRETSON, H. C., III N80-13039
GARVIN, J. F., JR. N80-13951
GASCHNIG, J. G. N80-13803
GAST, T. N80-13207
GAUTAM, R. N80-13184
GEBHARD, C. C. N80-13196
GEISEL, J. E. N80-13091
N80-13092
GELMAN, B. G. N80-14007
GENDRIN, R. N80-13541
GERHARD, M. A. N80-13793
GERHARD, W. N80-13768
GEYER, F. F. N80-13952
GEYER, G. B. N80-13253
GHERSINI, G. N80-13086
GHOVANLOU, F. N80-13817
GIERATHS, W. N80-13131
GILBERT, W. P. N80-13002
GILBERT, W. S. N80-13376
GILHOUSEN, D. B. N80-13746
GILLEN, K. T. N80-13494
GILLIS, R. G. N80-13168
GILMAN, F. J. N80-13904
GINSBERG, J. H. N80-13311
GITTLEMAN, J. I. N80-13670
GLICKSMAN, M. E. N80-13108
GLOECKLER, G. N80-13132
GLUYAS, R. E. N80-13171
GOBLISH, B. N80-13368
GOGINENI, P. R. N80-12993
GOGLIA, G. L. N80-13058
GOLDSTEIN, S. A. N80-13901
GOLOVIN, Y. M. N80-14004
GOMBERG, R. I. N80-13730
GOMEZ-GALLARDOY LATAPI, J. I. N80-13210
GONDI, P. N80-13080
GONFALONE, A. N80-13535
GONZALEZGRACIA, G. G. N80-13247
GOODWIN, P. A. N80-13729
GOON, M. N80-13017
GOPALAKRISHNAN, K. V. N80-13276

GOULARD, R. N80-13197
GRAAE, J. A. E. N80-13685
GRAFAREND, E. W. N80-13731
GRAHAM, H. C. N80-13254
GRAHAM, R. A. N80-13264
N80-13974
GRANT, I. D. R. N80-13422
GRARD, R. N80-13536
N80-13537
GRAY, R. J. N80-13232
GRECHNEV, K. V. N80-14005
GREENLAW, R. C. N80-13793
GREENWALD, R. A. N80-13552
GRETHER, D. F. N80-14015
GRIMM, G. E. N80-13899
GROSBECK, D. N80-13881
GROSS, E. H. N80-13333
GROSSBACH, R. N80-13088
GROTJAHN, R. D. N80-13740
GROVE, R. C. N80-13032
GRUBER, J. P. N80-13926
GRYSON, P. N80-13008
GUENIN, B. M. N80-13314
GUPTA, A. K. N80-13322
GUPTA, G. D. N80-13698
GUPTA, S. S. N80-13834
GURLAND, J. N80-13229
GURNETT, D. A. N80-14008
N80-14009
GURNEY, R. J. N80-13599
GUTBERLET, L. C. N80-13292
GUYENNE, T. D. N80-13069

H

HABERCOM, G. E., JR. N80-13425
N80-13426
HABERKORN, W. A. N80-13981
HAEUSING, M. N80-13795
HAFSTROM, J. W. N80-13261
HAGEFSTRATION, J. E. N80-13452
HALBLEIB, J. A. N80-13901
HALL, N. R. N80-13984
HAMACHI, G. N80-13826
HAMDI, A. H. M. N80-13464
HAMILTON, N. I. N80-13687
HAMMOND, B. N80-13638
HAMSTAD, M. A. N80-13177
HANDLEY, L. M. N80-13646
HANKE, P. N80-13929
HANSON, D. N80-13633
HANSON, J. M. N80-13647
HAPAG, G. N80-13178
HAPPER, W. N80-13203
HARNETT, R. M. N80-13764
HARRINGTON, T. P. N80-13883
HARRIS, J. G. N80-13505
HARRIS, J. S. N80-13365
HARRIS, L. H. N80-13149
HARRIS, M. G. N80-13347
HARRIS, S. E. N80-13923
HART, E. W. N80-13231
N80-13519
HARTMAN, P. N80-13773
HARVEY, N. M. N80-13892
HASKELL, P. N80-13146
HASSAN, H. A. N80-13449
HAUSER, J. R. N80-13661
HAUSMAN, P. D. N80-13053
HAVEN, K. F. N80-13648
HAYES, E. R. N80-13685
HAYNES, J. M. N80-13103
HEATON, R. A. N80-13953
HECKES, A. A. N80-13709
HEELIS, R. A. N80-13551
HEIDE, W. M. N80-13088
HEIKKILA, W. J. N80-13577
HEINE, W. N80-13016
HEINEMANN, R. F. N80-13185
HEISING, H. N80-13775
HELSLEY, C. W. N80-13030
HEMENWAY, A. N80-13286
HENDEL, R. H. N80-13955
HENDERSON, D. B. N80-13460
HENDERSON, J. N80-13242
HENDRIE, S. D. N80-13665
HENEIN, G. E. N80-13216
HENNESSEY, J. P., JR. N80-13723
HENRIQUEZ, M. N80-13648
HENSON, T. J. N80-13522
HEPLER, E. L. N80-13346
HEPP, W. N80-13768
HERR, K. N80-13101
HERRICK, D. L. N80-13323
HERRON, G. J. N80-13825
HERZOG, G. N80-13130
N80-13344
HICKS, D. N80-13844
HICKS, H. R. N80-13827
HILL, C. W. N80-13560
HILL, T. W. N80-13571
HILLER, H. N80-13137
HILLIARD, J. N80-13970
HIMMEL, R. P. N80-13359
HINKEBEIN, T. E. N80-13709
HINRICHSEN, E. N. N80-13675
HIRZINGER, G. N80-13930
HOBAICA, E. C. N80-13312
HOCH, J. N80-13390
HOFFER, R. M. N80-13588
HOFFMAN, H. W. N80-13412
N80-13631
N80-13919
HOGG, G. W. N80-13463
HOLLENBERG, J. W. N80-13146
HOLLOWAY, B. N80-13566
HOLLOWAY, N. J. N80-13944
HOLMES, J. A. N80-13299
HOLZER, S. M. N80-13795
HOLZHAUSEN, K. P. N80-13337
HONG, Y. K. N80-13478
HOOD, D. W. N80-13821
HOOPER, J. N. N80-13081
HOPKINS, W. G. N80-13692
HOPKINSON, R. F. N80-13482
HOPWOOD, J. N80-13685
HORNSTRA, F. N80-13518
HORVAY, G. N80-13424
HOUDEVILLE, R. N80-13646
HOUGHBY, W. E. N80-13785
HOUSTON, G. B. N80-13132
HOVESTADT, D. N80-13839
HOWARD, J. C. N80-13954
HOWARD, W. H. N80-13213
HOWSON, T. E. N80-13869
HSIAO, P. N80-13428
HSIEH, N. N80-13223
HSU, S. C. N80-13962
HU, C. C. N80-13689
HUANG, H. N80-13108
HUANG, S. C. N80-13049
HUBBLE, J. D. N80-13284
HUCK, G. N80-13091
HUGO, F. N80-13975
HULTMAN, K. L. N80-13538
HULTQVIST, B. N80-13539
N80-13612
HUNDEMANN, A. S. N80-13614
N80-13615
N80-13715
N80-13716
N80-13719
N80-13720
HUNT, A. N80-14015
HUNT, M. S. N80-13722
HURST, J. J. N80-13971
HUTH, G. K. N80-13334
HUTTON, P. H. N80-13883
HYER, R. C. N80-13928

I

IGNATJEV, G. E. N80-13074
INGBERMAN, A. N80-13286
INGBERMAN, A. K. N80-13285
INGEBO, R. D. N80-13047
IPAVICH, F. M. N80-13132
ISENBERG, J. A. N80-13870
ISKANDER, S. K. N80-13524
ISSACS, H. S. N80-13238
ISTOMIN, V. G. N80-14005
ITTEN, K. I. N80-13611
IWATSUBO, T. N80-13301

J

JAIN, R. B. N80-13854
JALUFKA, N. W. N80-13447
JARVINEN, P. O. N80-13694
JEA, L. C. N80-13169
JECHART, E. N80-13925
JEDRZEJCZAK, A. N80-13076
JENKINS, J. T. N80-13231
JENSEN, R. B. N80-13387
JOHNS, D. J. N80-13305
JOHNSON, H. M. N80-13902
JOHNSON, J. L. N80-13995
JOHNSON, N. L. N80-13847
N80-13848
JOHNSON, W. H. N80-13646
JONES, D. I. G. N80-13308
JONES, J. E., JR. N80-13708
JONES, K. W. N80-13915
JONES, O. C., JR. N80-13417
N80-13418
JONES, R. F. N80-13651
JONES, R. N. N80-13319
JONES, R. R., III N80-13466
JONGUITUDFALCON, V. N80-13267
JOSEPH, L. M. N80-13285
JOSEPHY, N. H. N80-13872
JUDD, O. P. N80-13896
JUENGER, S. N80-13633
JUNKHAN, G. H. N80-13707

K

KACPRZYNSKI, J. J. N80-13511
KAHN, B. K. N80-13781
KAIHO, K. N80-13383
KAISER, T. R. N80-13543
KALAM, M. A. N80-13506
KALENDER, W. A. N80-13921
KALINOWSKI, A. J. N80-13300
N80-13304
KAMIYA, M. N80-13348
KANEDA, T. N80-13265
N80-13977
N80-13978
KANOUSE, B. N80-13643
KAPLOW, R. N80-13221
KARAGOZIAN, A. R. N80-13406
KASHER, J. N80-13372
KASPER, J. S. N80-13978
KASS, W. J. N80-13201
KATZ, J. N80-13203
KAUFMAN, E. L. N80-13634
KAY, J. N80-13648
KAYLAN, A. R. N80-13857
KEETON, S. C. N80-13725
KEIL, E. N80-13916
KELLY, J. D. N80-13728
KEMPER, W. D. N80-13672
KENDALL, D. S. N80-13396
KENEFIC, R. J. N80-13355
KENIK, E. A. N80-13432
KENNEDY, C. R. N80-13186
KENNEDY, E. W. N80-13841
KENNEDY, R. S. N80-13766
KENNINGTON, J. N80-13633
KEPPLER, E. N80-13545
KESKAR, D. A. N80-12995
KETTERSON, J. N80-13970
KHASHIMOV, F. R. N80-13071
KHRIAPOV, V. T. N80-13076
KHRJAPOV, V. I. N80-13096
KHRYAPOV, V. T. N80-13070
KIENAPPEL, K. N80-13059
KIM, D. K. N80-13292
KIM, W. C. N80-13834
KIM, Y. G. N80-13218
KIM, Y. H. N80-13508
KING-HELE, D. G. N80-13737
KING, F. D. N80-13905
KINGHORN, F. C. N80-13061
KINNEY, W. I. N80-13956
KINO, G. S. N80-13525
KINSLER, M. C. N80-13593
KINSLOW, L. P. N80-13891
KINTNER, P. N80-13557
KIRBY, F. M. N80-13161
KITZE, P. T. N80-13263
KLECKER, B. N80-13132
KLEIN, W. E. N80-13490
KLINCEWICZ, J. G. N80-13871
KNAPIK, J. N80-13765
KNAPP, W. D. N80-13317
KNOTT, K. N80-13537
KNOX, C. E. N80-13020
KNOX, S. O. N80-13931
KOENIG, D. R. N80-13906
KOHL, F. J. N80-13404
KOHN, W. N80-13969
KORMAN, C. S. N80-13957
KORTH, A. N80-13548
N80-13549
N80-13552
KOSCHE, H. N80-13726
KOTCHNEV, V. A. N80-14005
KOTIN, V. A. N80-14007
KOU, S. N80-13223
KOURTIDES, D. A. N80-13255
KOWAL, D. N80-13765
KOWALSKI, E. J. N80-13043
N80-13044
N80-13045
KRAJEWSKI, R. F. N80-13651
KRAKOWSKI, R. A. N80-13296
KRAUTH, A. N80-13266
KREMSER, G. N80-13548
N80-13549
N80-13552
KREUSER, J. L. N80-13808
KREUTZER, P. N80-13130
N80-13344
KRIEG, T. N80-13130
KRISCHKER, P. N80-13207
KROEGER, F. A. N80-13678
KRUEGER, W. N80-13776
N80-13777
KSANFORMALITI, L. V. N80-14006
KUEHL, G. G. N80-13031
KUHLMANN-WILSDORF, D. N80-13367
KUNDT, W. N80-13564
KUNKEL, W. B. N80-13938
KUPFAHL, G. N80-13774
KURKOV, A. P. N80-13046

L

LA-THANN, H. N80-13619
LAASKO, J. H. N80-13644
LACOE, R. N80-13970
LAM, C. Y. N80-13792
LAMANOV, N. I. N80-14007
LAMBARSKI, T. J. N80-13704
LAMBERTSON, G. R. N80-13376
LAMORTE, M. F. N80-13661
LANDRY, M. J. N80-13462
LANDSMAN, E. E. N80-13377
LANE, G. L. N80-13829
LANGE, H. H. N80-13794
LANGFORD, G. N80-13234
LANSING, N. N80-13703
LASSAHN, G. D. N80-13910
LAUB, J. N80-13826
LAUTERWASSER, B. D. N80-13507
LAW, C. K. N80-13200
LAWRENCE, K. A. N80-13649
LEATHERWOOD, J. D. N80-13769
LEDLEY, B. G. N80-13581
LEE, C. N80-13636
LEE, E. H. N80-13226
LEE, J. S. N80-13337
LEE, S. S. N80-13489
N80-13584
N80-13878
LEMAIGNAN, C. N80-13119
LEMAIRE, J. N80-13576
LENTZNER, H. L. N80-13985
LEON, R. V. N80-13859
LEONARD, J. I. N80-13770
N80-13771
LEONHARDT, W. J. N80-13417
LEROY, R. D. N80-13756
LEVCHUK, B. W. N80-14007
LEVI, C. G. N80-13223
LEWICKI, T. F. N80-13219
LEWIS, J. M. N80-13809
LI, D. F. K. N80-13509
LIDFORS, E. D. N80-13902
LIERKE, E. G. N80-13088
LIKHIN, O. N80-13539
LIN, C. S. N80-13547
LIN, R. P. N80-13547
LIND, A. C. N80-13173
LINDQVIST, P. A. N80-13535
LINTON, D. F. N80-13832
LIPATOV, A. N. N80-14007
LIPKIE, D. E. N80-13786
LIPMAN, H. B. N80-13860
LIPS, H. R. N80-13485
LISTER, E. N80-13624
LITTLE, F. F. N80-13825
LIVENGOOD, C. D. N80-13689
LOBE, N. N80-13285
LOCK, R. C. N80-13010
LOUCK, J. D. N80-13850
LOVETT, B. R. N80-13959
LOVOI, P. A. N80-13094
LOWE, G. F. N80-13810
LOYD, E. A. N80-13285
LUCAS, H. A. N80-13856
LUHMAN, T. S. N80-13383
LUKASIK, J. N80-13923
LUNDEGARD, P. N80-13735
LUNDIN, R. N80-13538
N80-13539
LUYENDIJK, T. N80-13085
LUZWICK, J. L. N80-13324
LYNN, K. G. N80-13971
LYONS, G. R. N80-13373

M

MAAHS, H. G. N80-13191
MABEY, D. G. N80-13055
MACDONALD, W. R. N80-13435
MACUR, J. E. N80-13948
MADNICK, S. E. N80-13792
MAGETTE, T. E. N80-13481
MAGLIOZZI, B. N80-13882
MAHESH, J. K. N80-13053
MAHUSON, T. C. N80-13473
MAINS, R. K. N80-13349
MAISCH, R. N80-13774
MAISH, A. B. N80-13671
MAJUMDAR, S. N80-13695
MALACHOWSKI, M. J. N80-13767
MALIK, R. K. N80-13187
MALININ, A. Y. N80-13070
MALLINCKRODT, A. J. N80-13817
MALMBERG, A. F. N80-13704
MALVERN, L. E. N80-13241
MANTENIEKS, M. A. N80-13159
MARAMAN, W. J. N80-13911
MARCINIAK, T. J. N80-13636
MARIANI, F. N80-13536
MARKOV, E. V. N80-13072
MARSCH, E. N80-14008
N80-14009
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N80-14011
N80-14012
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N80-13519
MARSH, W. D. N80-13050
MARTIN, C. H. N80-13023
MARTIN, E. P. N80-13735
MARTIN, J. A. N80-13918
MARTIN, M. V. N80-13498
MARTINEZ, I. N80-13480
MARTZ, C. W. N80-13632
MAST, T. S. N80-13457
MASTERSON, K. D. N80-13742
MAUK, S. C. N80-13013
MAURER, R. C. N80-13766
MAURI, R. E. N80-13830
MAUTZ, J. A. N80-13880
MAY, R. J., JR. N80-13457
MAYDEW, R. C. N80-13165
MAYNARD, J. B. N80-13136
MAYR, M. C. N80-13025
MAZUMDAR, J. N80-13061
MCALVERY, R. F., III N80-13542
MCBREEN, J. N80-13024
MCCANN, K. J. N80-13722
MCCARTHY, J. N80-13257
MCCARTY, J. L. N80-13199
MCCAULEY, M. E. N80-13617
MCCLISH, D. K. N80-13138
MCCURDY, D. A. N80-13241
MCDANIEL, E. W. N80-13223
MCDONALD, G. H. N80-13704
MCDOWELL, J. L. N80-13555
MCGEHEE, J. R. N80-13254
MCHUGH, A. N80-13547
MCKENZIE, J. F. N80-13547
MCKISSICK, B. T. N80-13173
MCLAUGHLIN, R. D. N80-13535
MCLEOD, A. H. N80-13832
MCMILLAN, J. A. N80-14007
MCPARTLAND, R. J. N80-13547
MEEKS, R. F. N80-13546
MEGUID, S. A. N80-12997
MEHRABIAN, R. N80-13007
MELICK, K. E. N80-13342
MENDE, S. B. N80-13218
MENDIRATTA, M. C. N80-13602
MENG, C. N80-13654
MENG, C. I. N80-13376
MERCER, C. E. N80-13686
MERCKER, E. N80-13602
MEREWETHER, D. E. N80-13666
MERRICK, H. F. N80-13007
MESSMAN, L. N80-13833
METZ, P. D. N80-13772
MEUSER, R. B. N80-13500
MEYER, C. F. N80-13248
MEYERS, C. D. N80-13316
MICHEL, J. W. N80-13444
MICHEL, U. N80-13640
MIDDLETON, M. R. N80-13990
MIENTUS, J. N80-13835
MIGLIORE, H. J. N80-13365
MIJOVIC, J. N80-13191
MILEWSKI, C., JR. N80-13404
MILEY, G. H. N80-13818
MILLER, A. K. N80-13452
MILLER, C. F. N80-13754
MILLER, C. W. N80-13475
MILLER, D. L. N80-13190
MILLER, I. M. N80-13410
MILLER, R. A. N80-13753
MILLER, R. W. N80-13901
MILLER, T. G. N80-13540
MINCHEW, C. D. N80-13211
MINER, J. R. N80-13752
MITANI, T. N80-13054
MITCHELL, A. C. N80-13918
MITCHELL, R. D. N80-13824
MIX, L. P. N80-13787
MIZERA, P. F. N80-13041
MOHR, T. W. N80-13758
MOLINELLI, E. J. N80-13230
MONDOL, N. K. N80-13788
MONTAN, D. N. N80-13269
MONTGOMERY, D. C. N80-14004
MOORGAT, H. N80-13461
MORAN, F. J. N80-13529
MORGAN, P. W. N80-14004
MORJARIA, M. N80-13523
MOROH, M. N80-13255
MORONEY, J. J. N80-13535
MOROZ, V. I. N80-14008
MORRIS, J. R. N80-14010
MORT, J. N80-14011
MOSHKIN, B. E.
MOSS, W. C.
MOUSSA, A.
MOZER, F. S.
MUELHAEUSER, K. H.
MUELLER, G. N80-14012
MUELLER, I. I. N80-14013
MUELLER, K. N80-14014
MUKHERJEE, S. N80-13117
N80-13731
N80-13129
N80-13230
N80-13516
MUKHIN, L. M. N80-14007
MUKUNOKI, I. N80-13392
MURPHY, D. L. N80-13722
MURPHY, R. W. N80-13412
MURTHY, B. S. N80-13276
MURTHY, P. N. N80-13307

N

NAGAKAWA, J. N80-13961
NAGLE-ESHELMAN, J. N80-13306
N80-13310
N80-13495
N80-13499
NAPOLITANO, L. G. N80-13105
N80-13114
NARAYANAN, T. V. N80-13698
NAVE, R. L. N80-13033
NAYEBHASHEMI, H. N80-13489
N80-13878
NEEDLEMAN, A. N80-13229
NEISWANDER, P. G. N80-13684
NEITZEL, G. P., JR. N80-13391
NELLIS, W. J. N80-13410
NELSON, E. L. N80-13607
NELSON, J. E. N80-13997
NELSON, W. G. N80-13064
NEMEC, J. N80-13609
NENAROKOV, D. F. N80-14007
NERI, L. M. N80-13253
NESS, N. N80-13414
NEWMAN, A. L. N80-13397
NEWMAN, J. C., JR. N80-13512
NG, P. H. N80-13934
NICHOLS, H. E. N80-13807
NICHOLS, J. D. N80-13593
NICHOLS, L. N80-13624
NICKELL, R. E. N80-13920
NIEDZWIECKI, R. W. N80-13624
NIESWAAG, H. N80-13085
NISHIOKA, K. N80-13333
NITSCHE, R. N80-13079
NOEL, G. T. N80-13688
NOLL, S. A. N80-13653
NORDIN, C. W. N80-13626
NORDSTROM, T. V. N80-13375
NORTHRUP, C. J. M. N80-13709
NORTON, D. J. N80-13472
NOVICK, R. N80-13203
NTAFOS, S. C. N80-13811

O

OBEROI, H. S. N80-13668
OCHOA, A., JR. N80-13382
OCHOTIN, A. S. N80-13095
N80-13096
OERTEL, H., JR. N80-13112
OGALLAGHER, J. J. N80-13132
OKHOTIN, A. S. N80-13074
N80-13075
N80-13076
OKHOTNIKOV, B. P. N80-14007
OKUMOTO, K. N80-13486
OLDFIELD, M. L. G. N80-13436
OLKIN, I. N80-13865
OLSEN, J. N. N80-13901
OLSON, G. B. N80-13222
OLSONN, G. K. N80-13660
OMELCHENKO, A. N80-13539
ONA, A. L. N80-13593
ORR, P. K. N80-13812
OSTROWSKI, P. P. N80-13270
OWENS, W. L. N80-13657

P

PACK, J. D. N80-13846
PAIGE, R. A. N80-13797
PALMER, L. D. N80-13194
PALMITER, L. N80-13653
PANAYOTOU, N. F. N80-13212
PAND, C. S. N80-13979
PANESSA-WARREN, B. J. N80-13760
PAPO, H. B. N80-13731
PARENTE, F. A. D. F. C. N80-13889
PARFENTEV, N. A. N80-14004
PARKS, F. G. N80-13328
PARKS, G. K. N80-13547
PARRISH, R. V. N80-13024
PARTRIDGE, D. R. N80-13813

PARZEN, E. N80-13867
PASCHMANN, G. N80-13532
PASSMAN, R. N80-13286
PATRICK, W. C. N80-13918
PATTEISKY, K. N80-13284
PATTERSON, W. J. N80-13258
PAULSON, J. W., JR. N80-12994
PAVLI, A. J. N80-13163
PAVON, M. N80-13858
PEDERSEN, A. N80-13535
N80-13536
N80-13537
PEFLEY, R. K. N80-13276
PELLAT, R. N80-13547
PENDERGRASS, J. H. N80-13296
PEPPER, R. L. N80-13766
PEREPEZKO, J. H. N80-13118
PERRAUT, S. N80-13541
PERSSON, T. N80-13120
PETERSON, E. M. N80-13199
PETROVA, E. V. N80-14006
PETSCHEK, A. G. N80-13460
PFEIL, E. N80-13127
PHILIPPOVICH, N. N80-13082
PHILOBOS, B. M. N80-13327
PHINNEY, D. E. N80-13589
PHULPIN, T. N80-13739
PICKETT, D. F., JR. N80-13265
PIETY, K. R. N80-13481
PILATI, D. A. N80-13650
PILIPP, W. G. N80-14008
N80-14009
N80-14010
N80-14011
N80-14012
PILKINGTON, J. A. N80-13126
PISSARENKO, N. N80-13538
N80-13539
PLOUSSIOS, G. N80-13339
PODOLINNI, A. F. N80-13070
POESCHEL, R. L. N80-13158
POLEZHAEV, V. I. N80-13073
PONGRATZ, M. B. N80-13167
PONNUSAMY, J. A. J. R. N80-13354
POOTH, L. A. N80-13296
PORE, M. D. N80-13591
PORTERFIELD, J. D. N80-13029
POTARD, C. N80-13100
POTEMRA, T. A. N80-13554
POTTER, P. E. N80-13735
POTTER, R. M. N80-13054
POUKEY, J. W. N80-13901
POWELL, J. D. N80-13965
POWELL, W. W., SR. N80-13151
POZEFSKY, D. P. N80-13796
PRAIZEY, J. P. N80-13124
PRASAD, J. N80-13243
PRATT, H. R. N80-13733
PREISSER, F. N80-13111
PRELAS, M. A. N80-13445
PRICE, H. L., JR. N80-13244
PRICE, R. J. N80-13178
PRUITT, J. R. N80-13764
PRYOR, W. A. N80-13735
PULICE, J. N80-13286
PULLMAN, B. N80-13274
PURA, C. A. N80-13005
PUTT, R. A. N80-13659

Q

QUAM, L. H. N80-13603
QUEIJO, M. J. N80-12995
QUINN, R. K. N80-13684
QUINTENZ, J. P. N80-13901

R

RACHOWITZ, B. I. N80-13174
RACK, H. J. N80-13224
RADATZ, J. N80-13826
RADES, M. N80-13497
RAGHUNATHAN, K. N80-13947
RAJU, I. S. N80-13512
RAMSEY, H. R. N80-13821
RAMSPOTT, L. D. N80-13918
RAND, J. L. N80-13472
RANDKLEV, E. H. N80-13960
RANKEN, W. A. N80-13906
RANSOM, C. M. N80-13209
RAO, B. L. S. P. N80-13864
RAO, S. S. N80-13496
RAPPOLD, A. N80-13130
RASMUSSEN, D. H. N80-13118
RAVETTI, R. G. N80-13359
RAYBORN, G. H. N80-13429
REDDY, K. P. R. N80-13179
REDINGTON, P. K. N80-13189
REDISH, E. F. N80-13851
REECE, E. W. N80-13431
REED, R. P. N80-13974
REED, W. E. N80-13388
N80-13389
REIFF, P. H.
REILLY, M. H.
REIMANN, K. J.
REINEKE, R. C.
REISENFELD, S.
REME, H.
RENTZ, R. L.
REPPERT, R. T.
REUTER, R. C., JR.
REYNOLDS, D. B.
RHODES, P. H.
RICCITIELLO, S. R.
RICE, J. G.
RICE, J. R.
RICE, R. J.
RICE, R. W.
RICHARDS, P. I.
RICHARDS, T. R.
RICHTER, B.
RICHTER, D.
RIEGER, N. F.
RIESENFELD, R. F.
RILEY, P.
RILEY, T.
RIND, E.
RINGO, M.
RITSCHARD, R. L.
RIVORD, G. E.
ROACH, F.
ROBERT, P.
ROBIN, A. M.
ROBINSON, C. P.
ROBINSON, J. D.
ROBINSON, K. K.
ROCAFORT, J.
RODGERS, R. J.
ROLAN, R. G.
ROME, J. A.
ROSENBAUER, H.
ROSOCHA, L. A.
ROSOLOWSKI, J. H.
ROSS, C. B.
ROSS, M.
ROSSITTO, F.
ROTH, L.
ROTH, M. A.
ROTHBAUER, G.
ROTHE, E. W.
ROTHER, D.
ROTHROCK, C. W.
ROUX, A.
ROVERA, G.
ROWCLIFFE, A. F.
ROWCLIFFE, D. J.
ROWE, M.
RUBIN, H.
RUBLOFF, G. W.
RUCKNER, H.
RUDERMAN, M.
RUSHFORTH, C. K.
RUSSELL, C. T.
RUSSELL, G. R.
RUSTAGI, J. S.
RUSTON, H.
RYCROFT, M. J.

S

SABATINI, R.
SAFLEKOS, N. A.
SAGDEEV, R. Z.
SAHM, K. F.
SAKATA, T.
SALAHI, A.
SALZANO, F. J.
SAMAGA, B. S.
SAMUELS, G.
SAMUELS, N.
SANDAHL, I.
SANDERS, R. T.
SANDRECZKI, T. C.
SANKO, N. F.
SAOCO, M.
SARI, S. O.
SARIKAYA, M.
SARIPALLI, K. R.
SARMA, G. S. R.
SATORIUS, E. H.
SAUNDERS, M. A.
SAWYER, W. C.
SCHAEFFER, R. J.
SCHARMANN, A.
SCHAWER, J.
SCHEFF, B. H. N80-13984
SCHEIDERICH, J. P. N80-13336
SCHERKOSKE, K. D. N80-13235
SCHILLER, T. G. N80-13646
SCHINDLER, S. R. N80-13266
SCHMERR, L. W. N80-13514
SCHMIDT, E. N80-13060
SCHMUCKER, R. H. N80-13485
SCHNECK, P. B. N80-13798
SCHNEIDER, R. T. N80-13439
SCHOBERL, M. R. N80-13744
SCHOENEMAN, J. L. N80-13370
SCHOENSTER, J. A. N80-13879
SCHOLER, M. N80-13132
SCHUELE, D. E. N80-13458
SCHULLER, I. N80-13970
SCHUTZ, B. E. N80-13136
SCHWAB, J. R. N80-13361
SCHWABE, D. N80-13111
SCHWAGER, S. J. N80-13861
SCHWEIGER, G. N80-13012
SCHWEITZER, K. N80-13083
SCHWENN, R. N80-14008
N80-14010
N80-14011
N80-14012
N80-14013
N80-14014
SCHWUTTKE, G. H. N80-13455
SCKOPKE, N. N80-13533
SCOTT, L. C. N80-13366
SCOTT, M. W. N80-13325
SCOTT, S. C. N80-13939
SCRIBOT, A. A. N80-13610
SCUDDER, D. W. N80-13933
SEAMAN, L. N80-13172
SEFIC, W. J. N80-13027
SEGUIN, B. N80-13597
SEIBERT, K. N80-13473
SEKERKA, R. F. N80-13077
SELIVERSTOV, V. I. N80-13070
SEMMENS, M. G. N80-13704
SENDER, F. N80-13021
SENNE, K. D. N80-13817
SHADOW, T. O. N80-13034
SHAM, T. L. N80-13517
SHAMAKIAN, R. L. N80-13208
SHAMSELDIN, A. A. N80-13862
SHANER, J. W. N80-13973
SHAPIRO, A. N80-13448
SHAPIRO, S. L. N80-13928
SHAW, J. H. N80-13525
SHEARER, J. W. N80-13385
SHEFFIELD, J. N80-13939
SHEFFLER, M. N80-13028
SHEHEEN, N. N. N80-13690
SHELLEY, E. G. N80-13553
SHEN, M. S. N80-13277
SHEPHERD, G. G. N80-13556
SHEPHERD, M. M. N80-13556
SHOCKEY, D. A. N80-13172
SHOKOOH, F. N80-13357
SHOOMAN, M. L. N80-13819
SHORE, C. P. N80-13402
SHULBERG, G. W. N80-13874
SHULTZ, R. D. N80-13326
SIAS, F. R. N80-13764
SICHEL, E. K. N80-13670
SICILIANO, C. L. B. N80-13673
SIEGEL, J. S. N80-13285
SIEKMANN, J. N80-13113
SIEMANN, H. N80-13089
SIGLEO, W. N80-13602
SIGNORINI, C. N80-13536
SIMPSON, L. N80-13366
SIMPSON, R. L. N80-13004
SINGER, M. I. N80-13285
SINGH, A. N80-13514
SINGH, J. J. N80-13429
SIRIGNANO, W. A. N80-13271
SJOHOLM, A. A. N80-13990
SKINGLE, C. W. N80-13055
SKLAD, P. S. N80-13226
SLAVIN, J. A. N80-13561
SLINN, W. G. N. N80-13723
SMAGA, J. A. N80-13682
SMAIL, H. E. N80-13688
SMITH, E. J. N80-13558
SMITH, L. M. N80-13252
SMITH, M. C. N80-13673
SMITH, M. D. N80-13384
SMITH, M. F. N80-13717
N80-13718
SMITH, R. E. N80-13049
SMITH, R. L. N80-13487
SMITHSON, J. H. N80-13285
SNEAD, C. L., JR. N80-13971
SNYDER, L. N80-13791
SOBIN, A. J. N80-13160
SOD, G. A. N80-13477
SOER, G. J. R. N80-13616
SOFKO, G. J. N80-13552
SOLOMIN, E. T. N80-13070
SOLOMON, A. D. N80-13639
SOLOMON, H. L. N80-13016
SONA, P. G. N80-13086

SONG, J. O. N80-13502
SONNERUP, B. U. O. N80-13580
N80-13581
SORENSEN, J. N80-13643
SOUTHWOOD, D. J. N80-13575
SPAANENBURG, H. N80-13783
SPARROW, F. T. N80-13650
SPENCER, D. A. N80-13017
SPENCER, R. L. N80-13330
SPERA, D. A. N80-13623
SPRENGER, H. N80-13083
SPUCKLER, C. M. N80-13404
SRINIVASAN, S. N80-13632
STAKHIV, E. N80-13602
STAMPER, K. R. N80-13275
STARKEY, J. P. N80-13967
STEARNS, C. A. N80-13404
STEIGER, D. N80-13823
STEINBERG, D. J. N80-13385
STEINBERG, M. N80-13294
STEINMETZ, G. G. N80-13024
STEMBER, L. H. N80-13688
STEPHENS, A. G. N80-13910
STEPHENSON, D. A. N80-13204
STEPHENSON, D. E. N80-13733
STEWART, W. F. N80-13297
STICKFORD, G. H. N80-13688
STICKLER, R. N80-13082
STIEFEL, R. N80-13130
N80-13344
STOCKEMER, F. J. N80-13268
STOCKER, F. R. N80-13814
STOCKTON, F. D. N80-13518
STOFFYN, M. A. N80-13586
STOLOFF, N. S. N80-13227
N80-13233
STOLTZ, D. L. N80-13967
STONE, S. C. N80-13544
STONES, C. R. N80-13053
STOREY, L. R. O. N80-13567
STORTI, G. N80-13697
STORY, A. S. N80-13596
STROBEL, D. F. N80-13744
STRONG, P. F. N80-13110
STRYKER, H. Y. N80-13646
STUHLBARG, S. M. N80-13359
SUCCOP, D. C. N80-13287
N80-13291
SUENAGA, M. N80-13383
SUKERT, A. N. N80-13491
SUNG, M. F. N80-13976
SUNYAEV, R. A. N80-14000
SUTHERLAND, C. D. N80-13167
SUTTON, S. B. N80-13379
SUVOROV, A. P. N80-14006
SWAROOP, R. N80-13863
SWAROOP, R. B. N80-13682
SZCZERBAKOW, A. N80-13076
SZYMASZEK, J. W. N80-13259

T

TABE, T. N80-13902
TADIKAMALLA, P. R. N80-13847
TAENZER, K. N80-13344
TAIWO, A. A. N80-13015
TANG, P. Y. N80-13521
TAPLEY, B. D. N80-13136
TAPONECCO, L. N80-13386
TARBELL, S. N80-13755
TARVER, C. M. N80-13411
TAYLOR, D. J. N80-13910
TAYLOR, J. J. N80-13451
TAYLOR, K. N80-13886
TAYLOR, P. E. N80-13853
TELLINI, A. N80-13386
TEMERIN, M. N80-13557
TENENBAUM, J. M. N80-13603
TESORO, G. C. N80-13255
THALER, B. N80-13970
THOMAS, E. W. N80-13457
THOMAS, J. L. N80-12994
THOMPSON, R. L. N80-13403
TIEN, J. K. N80-13483
TILLEY, B. I. N80-13168
TIMBARIO, T. J. N80-13283
TIMMER, B. R. N80-13664
TING, B. Y. N80-13838
TITARCHUK, L. G. N80-14000
TOLEDO, F. L. N80-13587
TORBERT, R. B. N80-13535
TORKU, K. E. N80-13353
TORNABE, A. J. N80-13174
TOURNIER, B. N80-13739
TRAEGER, R. K. N80-13272
TRAGNI, F. N80-13592
TRAMONTI, L. N80-13133
TREBBLE, W. J. G. N80-13062
TRISKA, A. N80-13095
N80-13096
TRNKA, J. N80-13096
TROUT, E. M. N80-13014
TSAO, G. T. N80-13278
TUCKER, T. R. N80-13456
TURFLER, R. M. N80-13704
TURNAGE, K. G. N80-13413
TURNER, A. A. N80-13821
TURNER, H. K. N80-13504
TURNS, S. R. N80-13468

U

ULITCHNY, M. G. N80-13224
URBAN, C. H. N80-13253
URTIEW, P. A. N80-13411

V

VAISBERG, O. N80-13539
VALLER, H. W. N80-13162
VANARSDALE, W. E. N80-13231
VANDAM, J. W. N80-13932
VANDERLAAN, J. E. N80-13340
VANMAANEN-ABELS, A. E. P. M. N80-13945
VANTHIEL, M. N80-13410
VARDAMAN, W. N80-13094
VAS, I. E. N80-13674
VASILCHIKOV, N. M. N80-14006
VASYLIUNAS, V. M. N80-13579
VELUSWAMI, M. A. N80-13518
VENTRICE, M. N80-13164
N80-13193
VENTURINO, M. N80-13016
VILLENEUVE, A. T. N80-13335
VISWANATHAN, K. N80-13350
VITS, P. N80-13122
VODGES, W. B. N80-13984
VOGEL, R. W. N80-13634
VOIGT, G. H. N80-13570
VONGLAHN, U. N80-13881
VOOK, R. W. N80-13972
VYAS, B. N80-13238

W

WACYK, I. T. N80-13958
WAGNER, S. N80-13607
WAHBEH, V. N. N80-13987
WAHL, M. N80-13608
WAHLIG, M. N80-14015
WALDMANN, H. N80-13147
WALKER, A. W. N80-13526
N80-13885
WALKER, F. N80-13142
WALKER, P. E. N80-13908
WALKER, W. R. N80-13672
WALTER, H. U. N80-13099
WALTERS, R. A. N80-13443
WALZER, W. N80-13648
WANG, B. C. N80-13351
WANG, C. A. N80-13110
WANG, J. C. N80-13265
N80-13977
WARD, D. S. N80-13668
WARD, J. C. N80-13668
WARMINSKI, T. N80-13076
WARNER, D. N. N80-13041
WARREN, C. H. E. N80-13037
WARREN, J. B. N80-13760
WARREN, W. J. N80-13170
WATSON, K. N80-13203
WEART, W. D. N80-13909
WEBB, R. L. N80-13707
WEBER, C. M. N80-13476
N80-13484
WEBER, E. J. N80-13555
WEBER, O. N80-13022
WEBSTER, B. N80-13061
WEBSTER, R. L. N80-13500
WEEKS, T. N80-13196
WEHMANEN, O. N80-13816
WEINBERG, Z. A. N80-13364
WEINSTEIN, I. N80-13402
WEISBLATT, E. A. N80-13596
WELLER, R. A. N80-13755
WELLS, G. W. N80-13064
N80-13065
WELLS, W. R. N80-12995
WELLS, W. T. N80-13753
WEMPLE, R. P. N80-13201
WENZEL, J. A. N80-13849
WENZEL, J. H. N80-13352
WENZEL, R. G. N80-13604
N80-13927
WESTMORELAND, P. R. N80-13295
WHEELER, D. B. N80-13161
WHEELER, G. V. N80-13434
WHITE, F. A. N80-13429
WHYTE, P. H. N80-12996
WICZER, J. J. N80-13373
WIDNER, M. M. N80-13901
WIERMAN, R. W. N80-13198
WIERUM, F. A. N80-13405
WIKER, S. F. N80-13766
WILDER, D. G. N80-13918
WILHITE, A. W. N80-13052
WILKEN, B. N80-13548
N80-13549
WILLIAMS, D. J. N80-13545
WILLIAMS, J. H., JR. N80-13488
N80-13489
N80-13878
WILLIAMS, R. T., III N80-13751
WILLIS, C. M. N80-13879
WILSON, J. W. N80-13448
WILZBACH, K. E. N80-13689
WITBRACHT, I. L. N80-13485
WITT, A. F. N80-13107
WOHLGEMUTH, J. N80-13697
WOLF, H. C. N80-13603
WOLF, J. A., JR. N80-13176
WOLF, M. A. N80-13723
WOLF, P. N80-13795
WOLF, S. M. N80-13520
WOLFF, M. N80-14002
WOLFF, W. A. N80-13656
WONG, K. W. N80-13164
WOOD, D. B. N80-13910
WOOD, G. M., JR. N80-13429
WOODARD, D. W. N80-13949
WOODCOCK, D. L. N80-13035
N80-13036
N80-13038
WOODLEY, N. H. N80-13635
WOODWARD, P. R. N80-14001
WOOLLEY, S. K. N80-13590
WOOSTER, W. G. N80-13436
WORKHOVEN, V. E. N80-13645
WRIGHT, G. T. N80-13180
WRIGHT, J. N80-13765
WRIGLEY, C. N80-13697
WU, B. J. C. N80-13417
WU, C. L. N80-13784
WU, J. J. N80-13051
WUEST, W. N80-13011
N80-13104
WYNNE, F. E. N80-13287
N80-13291

Y

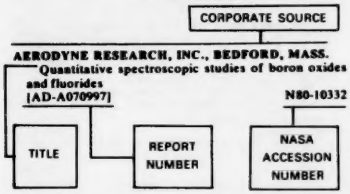
YABLONSKAYA, O. V. N80-14006
YABROVA, L. V. N80-14006
YAGER, T. J. N80-13013
YANG, C. Y. N80-13503
YANG, K. H. N80-13455
YANIV, A. N80-13969
YANNUCCI, D. N80-13378
YAO, N. P. N80-13641
YEE, K. S. N80-13372
YEN, W. M. N80-13459
YIMER, B. N80-13618
YODER, D. N80-13401
YOON, Y. S. N80-13469
YOUNG, G. A. N80-13734
YOUNG, J. F. N80-13923

Z

ZACHARIADES, A. E. N80-13251
ZACHAROV, A. N80-13538
N80-13539
ZACHARY, L. W. N80-13514
ZAHAVI, J. N80-13220
ZAIDMAN, S. N80-13057
ZALUZEC, N. J. N80-13240
N80-13432
ZAPLATYNSKY, I. N80-13256
ZEILINGER, H. N80-13083
ZHELANNI, Y. M. N80-13070
ZIMMER, G. A. N80-13417
ZIMMERMAN, D. K. N80-13644
ZINN, J. N80-13167
ZOLLARS, G. F. N80-13613
ZOLOTUKHIN, V. S. N80-14007
ZUBRITSKIJ, I. A. N80-13076
N80-13096
ZULUETA, P. J. N80-13359
ZURAWSKI, D. E. N80-13684
ZYCH, L. J. N80-13923

CORPORATE SOURCE INDEX

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ACADEMY OF SCIENCES [USSR], MOSCOW.
The multipurpose apparatus Crystal for process experiments in space
N80-13070
Structural and physical characteristics of InSb single crystals grown under near-zero gravity conditions
N80-13071
The influence of space conditions on directional crystallization of germanium and its properties
N80-13072
Convective processes at low gravity
N80-13073
Investigation of the structure of Te-Se solid solutions obtained under different gravity conditions on board the Salyut 6 station, in a centrifuge
N80-13074
Crystal growth from the vapor phase with an inert component present
N80-13075
Experiment SYRENA 1, 2, 3: Space processing of CdHgTe, CdHgTe and PbSeTe
N80-13076
Czechoslovakian preliminary program of material research in space
N80-13095
Experiment MORAVA on board Salyut 6
N80-13096
Iron line emission from the Alfven shell in X-ray binaries
[PR-450] N80-13998
Compton shift of X-rays in plasma clouds: Typical radiation spectra
[PR-441] N80-14000
The spectrophotometric experiment on board the Venera-11, Venera-12 probes: Some results from the analysis of the Venus day-sky spectrum
[D-270] N80-14004
Mass spectrometer measurements of the Venus lower atmosphere composition
[D-271] N80-14005
Electrical discharges in the Venus atmosphere
[D-272] N80-14006
Gas chromatograph analysis of the Venus atmosphere chemical composition on board the Venera-12 automatic interplanetary station
[D-275] N80-14007

ACUREX CORP., MOUNTAIN VIEW, CALIF.
Synthesis of improved polyester resins
[NASA-CR-159665] N80-13257

ADELAIDE UNIV. [AUSTRALIA].
A review of approximate methods for determining the vibrational modes of membranes
N80-13498

ADMIRALTY MARINE TECHNOLOGY ESTABLISHMENT, TEDDINGTON [ENGLAND].
Assessment of a method for predicting the drag and boundary layer development on a body of revolution at zero incidence
[AMTE[N]-R-78111] N80-13006
The effect of analysis bandwidth on the accuracy of measurements and predictions of single degree of freedom system behavior
[AMTE[N]-TM-79401] N80-13526
Estimation of the RMS value of summed sinusoids and the application to acoustic noise measurement in shallow water
[AMTE[N]-TM-78413] N80-13885

AEG-TELEFUNKEN, HEILBRONN [WEST GERMANY].
Epitaxy at reduced temperatures
[BMFT-FB-T-78-52] N80-13980

AEROJET ENERGY CONSERVATION CO., SACRAMENTO, CALIF.
Multi-use geothermal energy system with augmentation for enhanced utilization. Non-electric application of geothermal energy in Susanville, California
[DOE/ET-248447/1] N80-13660

AEROJET LIQUID ROCKET CO., SACRAMENTO, CALIF.
Design, fabrication and delivery of a high pressure LOX-methane injector
[NASA-CR-161343] N80-13162

AEROSPACE CORP., EL SEGUNDO, CALIF.
A numerical solution for temperature distributions in a discrete injection transpiration-cooled nosetip system
[AD-A073340] N80-13406
Solar Total Energy Systems [STES] simulation program user's guide
[ORNL/SUB-7525/2] N80-13664

AEROSPACE CORP., LOS ANGELES, CALIF.
Observations of ion and electron distributions during the July 29 and July 30, 1977 storm period
N80-13540

AGBABIAN ASSOCIATES, EL SEGUNDO, CALIF.
Review of earthquake vibratory ground motion intensity attenuation relationships
[SAN-1011/119] N80-13734

AIR FORCE AERO PROPULSION LAB., WRIGHT-PATTERSON AFB, OHIO.
Build 2 of an accelerated mission test of a TF-41 with block 76 hardware
[AD-A073436] N80-13050

AIR FORCE ENGINEERING AND SERVICES CENTER, TYNDALL AFB, FLA.
Corrosion control of Hardened Intersite Cable System [HICS] splice case
[AD-A073431] N80-13219

AIR FORCE FLIGHT DYNAMICS LAB., WRIGHT-PATTERSON AFB, OHIO.
Digital load control applied to full-scale airframe fatigue tests
[AD-A073588] N80-13054
Airflow effects on fires, part 2
[AD-A073486] N80-13196

AIR FORCE MATERIALS LAB., WRIGHT-PATTERSON AFB, OHIO.
High temperature damping of dynamic systems
N80-13308

AIR FORCE WEAPONS LAB., KIRTLAND AFB, N. MEX.
Nuclear pumped lasers: Advantages of O2 [1 delta]
N80-13451
Computational experiments on two error estimation procedures for ordinary differential equations
[AD-A073768] N80-13844

ALASKA UNIV., COLLEGE.
Radar measurements of temperatures and ionic composition in the high-latitude ionosphere
N80-13728
A theory for the asymmetry in the auroral ionization density profile for the generation of auroral infrasonic waves
N80-13729

ALFRED UNIV., N.Y.
Structures, spectra and related properties of titanium-, zirconium-, and hafnium-doped vitreous silica
N80-13245

ALLIED CHEMICAL CORP., IDAHO FALLS, IDAHO.
Laboratory design for modern analytical instruments
[CONF-790702-1] N80-13434

AMES LAB., IOWA.
Surface-crack characterization by use of dynamic photoelastic spectroscopy
[IS-M-211] N80-13514
Fossil energy program. 1. Mining research and development: Coal preparation and analysis
[IS-4655] N80-13679
Fossil energy program, 1. Mining research and development: Coal preparation and analysis
[IS-4703] N80-13702

AMOCO OIL CO., NAPERVILLE, ILL.
Catalyst development for coal liquefaction
[EPRI-AF-1084] N80-13292

APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., LAUREL, MD.
Birkeland currents and the interplanetary magnetic field
N80-13554

ARGONNE NATIONAL LAB., ILL.
Thermal stability and decomposition kinetics of amorphous hydrogenated films
[CONF-790442-12] N80-13199
Membrane oxygen enrichment cost and application evaluation
[ANL-78-108] N80-13205
Domain and surface structures of sodium tungsten bronzes, Na/sub x/WO3 [0.4 x 1]
[ANL-78-63] N80-13237
Development of tungsten coatings for the corrosion protection of alumina-based ceramics
[CONF-790442-13] N80-13261
World Energy Data System [WENDS]. Volume 7: Nuclear facility profiles, AG-CH
[ANL-PMS-79-2-VOL-7] N80-13629
World energy data system [WENDS]. Volume 8: Nuclear facility profiles, CO-HU
[ANL-PMS-79-2-VOL-8] N80-13630
Assessment of Stirling engine potential in total and integrated energy systems
[ANL/ES-76] N80-13636
Heat transfer in lead-acid batteries
[CONF-7809102-1] N80-13641
Development and evaluation of materials for high temperature lithium/sulfur rechargeable batteries
[DOE/TIC-10098] N80-13682
Development of porous sintered-ceramic separators for application in a Li-Al/LiCl-KCl/FeS battery
[CONF-790526-2] N80-13683
Engineering development of lithium/metal sulfide battery technology for vehicle propulsion
[ANL-79-1] N80-13685
Status of development, energy and economics aspects of alternative technologies
[CONF-790371-1] N80-13689
Materials testing for central receiver solar-thermal power systems
[TID-29443] N80-13695
OTEC power systems
[CONF-790444-2] N80-13696
Community heating and cooling systems
[CONF-790446-6] N80-13706
Scattering of ultrasonic waves by periodically roughened surfaces
[CONF-790505-17] N80-13884
Technical support for open-cycle MHD program
[ANL/MHD-79-4] N80-13937
Fusion power program
[ANL/FPP-78-4] N80-13941
Transport properties of the compositionally modulated alloy Cu/Ni
[CONF-790341-8] N80-13970

ARIZONA UNIV., TUCSON.
Metal silver-liquid interface: Oxide properties from reflectance and scattered light spectroscopy
[COO-4381-7] N80-13235

ARMY MISSILE COMMAND, REDSTONE ARSENAL, ALA.
Simulation studies for a nuclear photon pumped excimer laser
N80-13452

ARMY MISSILE RESEARCH AND DEVELOPMENT COMMAND, REDSTONE ARSENAL, ALA.
Compilation of data relevant to nuclear pumped lasers, volume 5
[AD-A073575] N80-13457

ARMY RESEARCH INST. OF ENVIRONMENTAL MEDICINE, NATICK, MASS.
Development and description of a device for static strength measurement in the armed forces examination and entrance station
[AD-A068684] N80-13765

ARO, INC., ARNOLD AIR FORCE STATION, TENN.
A-10 carriage loads test
[AD-A073442] N80-13034

Evaluation of airjet distortion generator used to produce steady-state, total-pressure distortion at the inlet of a General Electric F101-GE-100 turbofan engine
[AD-A072743] N80-13049

ASSOCIATION AERONAUTIQUE ET ASTRONAUTIQUE DE FRANCE, PARIS.
Unsteady turbulence in oscillating flow
[AAAF-NT-79-11] N80-13009
The development of active control and its application to flutter suppressors
[AAAF-NT-79-02] N80-13056

ATOMIC ENERGY OF CANADA LTD., PINAWA [MANITOBA].
Conceptual design study of a concrete canister spent-fuel storage facility
[AECL-6301] N80-13902

ATOMIC WEAPONS RESEARCH ESTABLISHMENT, ALDERMASTON [ENGLAND].
An iterative unfolding technique
[ARWE-O-25/79] N80-13853

ATOMICS INTERNATIONAL DIV., GOLDEN, COLO.
Co-sputtering of aluminum-silver alloy mirrors for solar reflectors
[RFP-2896] N80-13626

AVCO SYSTEMS DIV., WILMINGTON, MASS.
Arc-coal acetylene process development program
[COO-4507-4] N80-13282

AXIOMATIX, LOS ANGELES, CALIF.
Orbiter CIU/IUS communications hardware evaluation
[NASA-CR-160404] N80-13334

B

BABCOCK AND WILCOX CO., ALLIANCE, OHIO.
Development of automated welding processes for field fabrication of thick-walled pressure vessels: Electron beam method
[DOE/ET-2606/4] N80-13476
Development of automated welding processes for field fabrication of thick-walled pressure vessels: Electron beam method
[FE-2606-5] N80-13484

BALLISTIC RESEARCH LABS., ABERDEEN PROVING GROUND, MD.
Computer description of Black Hawk helicopter
[AD-A073444] N80-13031
Solitary wave propagation in the three-dimensional lattice
[AD-A071458] N80-13965

BATTELLE COLUMBUS LABS., OHIO.
Photovoltaic concentrator application experiment. Phase 1: A 150 kW photovoltaic concentrator power system for load-center applications with feedback into the utility grid
[DOE/CS-34267/1] N80-13688

BATTELLE INST., FRANKFURT AM MAIN [WEST GERMANY].
Positioning and mixing instrumentation employing electrostatic and acoustic principles
N80-13088

BATTELLE PACIFIC NORTHWEST LABS., RICHLAND, WASH.
Pattern recognition methods for acoustic emission analysis
[NUREG-CR-0910] N80-13883

BAYLOR UNIV., WACO, TEX.
Molecular application to the equations of motions method
N80-13891

BDM CORP., ALBUQUERQUE, N. MEX.
Photovoltaic transient analysis program user's guide. Volume 1: Executive summary
[SAND-78-7038-VOL-1] N80-13704

BENDIX CORP., DAVENPORT, IOWA.
Anti-suffocation valve Bendix type no. 3267010-0101
[AD-A068927] N80-13772

BENDIX CORP., KANSAS CITY, MO.
Improved bondability to RTV silicone elastomer using rf-activated gas
[BDX-613-2157] N80-13260
Plasma cleaning end-of-process detection
[BDX-613-2229-REV] N80-13384
Electron microprobe analysis of tantalum-nitride thin films
[BDX-613-1198-REV] N80-13967

BITUMINOUS COAL RESEARCH, INC., MONROEVILLE, PA.
Gas generator research and development: BI-GAS process
[FE-1207-62] N80-13288

BOEING AEROSPACE CO., SEATTLE, WASH.
Solar power satellite system definition study. Volume 1, phase 1: Executive summary
[NASA-CR-160370] N80-13139
Solar power satellite system definition study. Volume 2, phase 1: Systems analyses tradeoffs.
[NASA-CR-160371] N80-13140
Solar power satellite system definition study. Volume 3: Reference system description, phase 1
[NASA-CR-160372] N80-13141
Solar power satellite system definition study. Volume 4: Silicon solar cell annealing test, phase 1
[NASA-CR-160373] N80-13142
Solar power satellite system definition study. Volume 5, phase 1: Executive summary
[NASA-CR-160374] N80-13143
Solar power satellite system definition study. Volume 6, phase 1: Space construction and transportation
[NASA-CR-160375] N80-13144
Solar power satellite system definition study. Volume 7, phase 1: SPS and rectenna systems analyses
[NASA-CR-160376] N80-13145

BOEING CO., SEATTLE, WASH.
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 1: Final report
[NASA-CR-159691] N80-13043
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 2: Users manual
[NASA-CR-159692] N80-13044
Computer code for estimating installed performance of aircraft gas turbine engines. Volume 3: Library of maps
[NASA-CR-159693] N80-13045

BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
Economic study of multipurpose advanced high-speed transport configurations
[NASA-CR-159126] N80-13986

BOEING ENGINEERING AND CONSTRUCTION, SEATTLE, WASH.
Linear concentration solar collector in an air supported enclosure. Preliminary design study
[SAND-78-7022] N80-13644

BOEING VERTOL CO., PHILADELPHIA, PA.
Analysis and correlation with theory of rotor lift-limit test data
[NASA-CR-159139] N80-13028

BOLOGNA UNIV. [ITALY].
Dispersed gaseous and solid phases in molten and solidified Cu
N80-13080

BONN UNIV. [WEST GERMANY].
Spindown of rotating magnets
N80-13564

BOSTON COLL., CHESTNUT HILL, MASS.
Dayside aurora and substorm current systems
N80-13555

BRISTOL UNIV. [ENGLAND].
Fundamental and applied aspects of fluid physics under microgravity
N80-13103

BRITISH AEROSPACE DYNAMICS GROUP, BRISTOL [ENGLAND].
Skylark sounding rocket facilities for materials science experiments
N80-13121

BROOKHAVEN NATIONAL LAB., UPTON, N. Y.
Neutron spectroscopy of fast hydrogen diffusion in BCC transition metals
[BNL-26075] N80-13225
Scanning reference electrode techniques in localized corrosion
[BNL-26094] N80-13238
Regenerative process for desulfurization of high temperature combustion and fuel gases
[BNL-50944] N80-13277
Coal conversion in flash hydropyrolysis reactors
[BNL-26209] N80-13294
Superconducting properties of [Nb,Ta]3Sn wires fabricated by the bronze process
[BNL-26391] N80-13383
Experimental investigations of nonequilibrium flashing of water in a converging-diverging nozzle
[BNL-NUREG-25716] N80-13417
Basic research needs in fluid mechanics
[BNL-50995] N80-13418
Hydrogen-halogen energy storage system
[BNL-50924] N80-13632
Process optimization of industrial energy use
[BNL-26482] N80-13650
Case study of the Brownell low energy requirement house
[BNL-50968] N80-13651
Design, construction, and operation of the solar assisted heat pump ground coupled storage experiments at Brookhaven National Laboratory
[BNL-25908] N80-13654
Low-cost RF system for a 2-megahertz heavy ion linear accelerator
[BNL-50960] N80-13914
BNL three-stage tandem accelerator facility
[BNL-26211] N80-13915
Bunched-beam p-p[-] and p-p collisions
[BNL-26240] N80-13916
Determination of the vacancy formation enthalpy for high purity Ni
[BNL-26191] N80-13971
Comparison of procedures for quantitative X-ray analysis in thin films
[BNL-25759] N80-13979

BROWN UNIV., PROVIDENCE, R. I.
Combined macroscopic and microscopic approach to the fracture of metals
[COO-3084-69] N80-13229
Elastic plastic analysis of growing cracks
[COO-3084-65] N80-13517

BUNDESANSTALT FUER MATERIALPRUEFUNG, BERLIN [WEST GERMANY].
Brazing under microgravity: TEXUS 2 experiment
N80-13082

BUREAU OF RECLAMATION, BOULDER CITY, NEV.
Solar thermal electric plants in hydroelectric grid
[DOE/SF/10505-1] N80-13663

C

CALIFORNIA INST. OF TECH., PASADENA.
Energetic electron bursts in the magnetopause electron layer and in interplanetary space
N80-13544

CALIFORNIA UNIV., BERKELEY.
Infrared absorption of spectroscopy of carbon monoxide on nickel films: A low temperature thermal detection technique
[LBL-8482] N80-13239
ISEE-1 and 2 magnetometer observations of the magnetopause
N80-13534
The magnetospheres of magnetic A stars and of pulsars
N80-13565
Direct measurements of the spectrum of the near millimeter cosmic background
[LBL-9374] N80-14016

CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Photochemistry of dinitrogen pentoxide
[LBL-9034] N80-13206
Computer simulation of martensitic transformations in idealized systems
[LBL-9264] N80-13228
Alloying and heat treatment optimization of Fe/Cr/C steels for improved mechanical properties
[LBL-9260] N80-13236
Eight-tesla synchroton dipoles: Design alternatives
[LBL-8410] N80-13376
Hybrid random choice method with application to internal combustion engines 2
[LBL-9423] N80-13477
Characterization of solid-waste conversion and cogeneration systems
[LBL-7883] N80-13648
Thermal performance of buildings and building envelope systems: An annotated bibliography
[LBL-8925] N80-13680
Instrumentation for environmental monitoring
[LBL-9323] N80-13722
Effects of ionizing radiation on the light sensing elements of the retina
[LBL-5683] N80-13767
Performance of a pressurized multiwire proportional chamber for neutron radiography
[LBL-9316] N80-13897
Vector current scattering in two dimensional quantum chromodynamics
[LBL-9022] N80-13907
Multimegawatt neutral beams for Tokamaks
[LBL-8891] N80-13938
Microstructure, sintering and strength of polycrystalline SiC
[LBL-9257] N80-13976
Figure control for a segmented telescope mirror
[LBL-8621] N80-13997
Measurement and analysis of circumsolar radiation
[LBL-9214] N80-14015

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Deformation and failure information from composite materials via acoustic emission
[UCRL-81272] N80-13177
Corona-discharge treatment of polymeric films. 2: Chemical studies
[UCRL-82709] N80-13263
Efficient numerical procedure for modeling antennas over lossy Earth
[UCRL-82121] N80-13341
Quasi-static electric field build-up between two spherical conductors
[UCID-18236] N80-13372
Development of alternate silicone potting compounds. Volume 5: Development of substitute no. 1 for Dow Corning's aerospace sealant DC93-122
[UCRL-52434-VOL-5] N80-13374
Temperature and thermal stress analysis of a switching tube anode
[UCID-18049] N80-13379
Fast opening switches carrying multimegampere currents and their application to high velocity shock waves in xenon
[UCRL-82134] N80-13385
Shock compression of liquid methane and the principle of corresponding states
[UCRL-82127] N80-13410
Effects of cellular structure on the behavior of gaseous detonation waves under transient conditions
[UCRL-82270] N80-13411
Time dependent propagation of high-energy laser beams through the atmosphere, 4
[UCRL-52654] N80-13461
Dynamic edge dislocation displacements and Peierls strains in a linear elastic strip
[UCRL-52787] N80-13523

Energy system in the Far West: Impacts of the National Energy Act of 1978
[UCRL-52754] N80-13638
Tidal pressure response as a reservoir engineering tool
[UCRL-83012] N80-13647
SLIC: An interactive mesh generator for finite element and finite difference application programs
[UCRL-81931] N80-13793
Piecewise cubic interpolation methods
[UCRL-81230] N80-13852
K-L and L-K vacancy sharing in ion-atom collisions
[UCRL-81947] N80-13894
Studies in molecular dynamics of the friction coefficient and the Lorentz gas
[UCRL-52815] N80-13895
Remote systems requirements of the High Yield Lithium Injection Fusion Energy [HYLIFE] converter concept
[UCRL-81309] N80-13908
Technical concept for test of geologic storage of spent reactor fuel in the Climax granite, Nevada Test Site
[UCID-18197] N80-13918
Equilibrium plasma corona surfaces
[UCID-18228] N80-13942
Surface motion and confinement potential for a microwave confined corona
[UCID-18227] N80-13943
Scientific literature: Can we keep it from ruining science
[UCRL-81118] N80-13985
Federal Laboratory Consortium for Technology Transfer. Far West Region Local Government Assistance Task Force
[UCID-18037-79-2] N80-13990
Star formation
[UCRL-81758] N80-14001

CALIFORNIA UNIV., LOS ANGELES.
Digital detection by digital signal processing techniques
N80-13331
The solar wind interaction with Venus
N80-13561
Antiparallel merging, the half-wave rectifier response of the magnetosphere, and convection
N80-13573
Magnetopause Kelvin-Helmholtz instability
N80-13575
Measurement, modeling and management of phased program behavior
N80-13813
Kinetic theory of ballooning instabilities
N80-13932

CALIFORNIA UNIV., RIVERSIDE.
Bayesian parameter and reliability estimation for a multivariate exponential distribution
N80-13862

CALIFORNIA UNIV., SAN DIEGO.
Delta-Rho, a second order trajectory perturbation technique
N80-13133
Studies of premixed hydrogen flames
N80-13190
National energy policy and state coastal programs: A critique of current efforts to balance environmental protection and energy production along the coast
[SAN-0034/263-1] N80-13643
Crustal structure in areas of active crustal accretion
N80-13727
Nonlinear hardy spaces and electrical power transfer
N80-13837

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA.
Absence of crystalline order in two-dimensions
[AD-A073672] N80-13968
A universal model for the surface energy of solids
[AD-A073671] N80-13969

CALIFORNIA UNIV., SANTA CRUZ.
Generating correct programs from logic specifications
N80-13799

CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
Influence of the space environment on some materials processing phenomena
N80-13077
Process oriented design aids for very large scale integrated circuits
N80-13348
Computational experiments with zero-one programming algorithms and heuristics
N80-13800
Performance measurement and analysis of certain search algorithms
N80-13803

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.
Oxygen diffusion in close packed oxides
N80-13179
Specificity hydrogen and stress corrosion cracking in austenitic stainless steel
N80-13208
Section size effects on toughness of various cast steels
N80-13210
The influence of thermal history, deformation, and composition, on stress corrosion cracking of ferritic stainless steels
N80-13211
Dipolar defect structure of laser and other transparent materials
[AD-A073815] N80-13458

CENTRE DE RECHERCHES EN PHYSIQUE DE L'ENVIRONNEMENT TERRESTRE ET PLANETAIRE, ORLEANS [FRANCE].
Kinetic theory of the boundary layer between a flowing isotropic plasma and a magnetic field
N80-13567
Report on French research into the ionosphere-magnetosphere from 1975 to 1978
[CRPE-DT-1039] N80-13738

CENTRE DE RECHERCHES EN PHYSIQUE DE L'ENVIRONNEMENT, ISSY-LES-MOULINEAUX [FRANCE].
Magnetic pulsations observed on board GEOS-2 in the ULF range during multiple magnetopause crossings
N80-13541

CENTRE NATIONAL D'ETUDES SPATIALES, PARIS [FRANCE].
Material sciences in space
[ESA-SP-142] N80-13069
SPOT, French preoperational remote sensing satellite system
N80-13610

CENTRE NATIONAL D'ETUDES SPATIALES, TOULOUSE [FRANCE].
A container for conditioning space experiments
N80-13093

CENTRO INFORMAZIONI STUDI ESPERIENZE, MILAN [ITALY].
UHV-chamber: Theoretical background and facility development
N80-13086

CHALMERS UNIV. OF TECHNOLOGY, GOTEBORG [SWEDEN].
An experimental method for determination of mass transport in liquid metals to be applied under microgravity
N80-13120

CHUBU INST. OF TECH., KASUGAI [JAPAN].
Reduction methods for problems of vibration of orthotropic plates. Part 1: Exact methods
N80-13309
Reduction methods for problems of vibration of orthotropic plates. Part 2: Generalized reduction method for generally orthotropic plates with arbitrary shape
N80-13501

CINCINNATI UNIV., OHIO.
Devonian paleocurrents of the Applachian basin
[METC/CR-79/22] N80-13735

CITY UNIV. OF NEW YORK, N. Y.
On the design and realization of two dimensional digital filters
N80-13351
Two-dimensional jet boundary interaction for submerged thermal discharges
N80-13390

CIVIL AEROMEDICAL INST., OKLAHOMA CITY, OKLA.
Evaluation of seating and restraint systems conducted during fiscal year 1978
[AD-A074881] N80-13014

CLEMSON UNIV., S.C.
Resuscitation from hypothermia: A literature review
[AD-A069093] N80-13764
Derivation of a quantitative model to assess the performance of research and development organizations
N80-13981

CLERMONT-FERRAND UNIV. [FRANCE].
Results of French experiments on crystal growth from a vapor phase conducted on the ground as a part of the space program
N80-13116

COAST GUARD, WASHINGTON, D.C.
Reliability, validity and application of an improved scale for assessment of motion sickness severity
[AD-A069130] N80-13766

COLORADO STATE UNIV., FORT COLLINS.
Solar cooling performance in CSU Solar House 3
[COO-2858-23] N80-13668
Trans-seasonal storage of solar energy: Innovative research program subtask
[COO-4546-3] N80-13672

COLUMBIA UNIV., NEW YORK.
Damage of metal surfaces by a hot, dense deuterium plasma
N80-13212
Creep behavior of precipitation and oxide dispersion strengthened superalloys
N80-13213
Mathematical problems arising from passive intermodulation interference in communications satellites
N80-13321
Theoretical and experimental studies of periodic currents and potentials in electroplating and in fast kinetics on a rotating disk electrode
N80-13350
Fatigue and creep behavior of Si3N4 and SiC for gas turbine applications
[EPRI-FP-1060] N80-13483
Long water wave propagation under the influence of the depth variation. Part 1: Long water waves incident upon a transition zone of an exponential depth variation. Part 2: Long water waves incident upon a seamount model of a linearly cylindrical depth variation
N80-13584
Isopycnal transport by the Antarctic circumpolar current and the Antarctic influence at intermediate water densities
N80-13752
A specification of data structures with application to data base systems
N80-13782

COMMISSARIAT A L'ENERGIE ATOMIQUE, GRENOBLE [FRANCE].
Preparatory studies for an experiment in directional solidification of immiscible Al-In alloys on board a rocket vehicle
N80-13100
Reconsideration of macrosegregation during nonstationary solidification
N80-13106
Nonstationary analysis of the macrosegregation during the solidification in the space of the system Ge-Ga
N80-13107
Study of the influence of gravity on the solidification of irregular eutectic alloys
N80-13119
Problems posed by the integration of materials science experiments with spacecraft systems
N80-13124

COMMISSARIAT A L'ENERGIE ATOMIQUE, PARIS [FRANCE].
Material sciences in space
[ESA-SP-142] N80-13069

COMMISSION OF THE EUROPEAN COMMUNITIES, ISPRA [ITALY].
Soil moisture and heat budget evaluation in selected European zones of agricultural and environmental interest
[E80-10019] N80-13598
Beauce TELLUS project
[E80-10024] N80-13600

COMMITTEE ON SCIENCE AND TECHNOLOGY [U. S. HOUSE].
Standard reference data program authorization
[GPO-25-887] N80-13315
Oversight: FAA R and D programs
[GPO-38-212] N80-13988

CORNELL UNIV., ITHACA, N. Y.
Satellite Doppler positioning in strengthening geodetic networks
N80-13015
Improved boundary-integral equation method for time-dependent inelastic deformation in metals
[COO-2733-20] N80-13230
Elongation upon torsion in a theory for the inelastic behavior of metals
[COO-2733-1] N80-13231
Nonlinear simulation of type 1 irregularities in the equatorial electrojet
N80-13397
Limit theorems for the reliability of series-parallel load-sharing systems
N80-13487
Microscopic mechanisms and mechanics of craze growth and fracture in polystyrene
N80-13507
Thermoviscoplastic response of cylindrical structures using a state variable model
[COO-2733-19] N80-13516
Experiment and prediction in the bending of a nickel beam at 200 deg C
[COO-2733-21] N80-13519
Low frequency waves and irregularities in the low altitude boundary layer
N80-13557
Verification of encapsulated implementations of algebraically specified data types
N80-13812
Generation and control of a slow space charge wave on a high current electron beam and its potential as a collective ion accelerator
N80-13900
Chromium doped semi-insulating gallium arsenide grown by liquid phase epitaxy
N80-13949
Transient phenomena in electron transport in semiconductors
[AD-A073009] N80-13966

COSMOSCIENCE ASSOCIATES, INC., STONY BROOK, N. Y.
Space environment and lunar surface processes
[NASA-CR-160363] N80-14003

D

DALTON, DALTON, LITTLE, AND NEWPORT, INC., CLEVELAND, OHIO.
Guidelines for multimedia environmental monitoring of Department of Energy fossil energy RD and D facilities
[FE-2495-T13-VOL-2] N80-13724
DANISH RESEARCH CENTER FOR APPLIED ELECTRONICS, HOERSHOLM.
Ceramic capacitors: A comparative investigation of the quality and stability of 23 manufactures and types, including disc, plate and multilayer capacitors
[ECR-87] N80-13387
DANISH SPACE RESEARCH INST., LYNGBY.
Critical level behavior of ion-cyclotron waves at magnetospheric boundary layers
N80-13542
DAYTON UNIV., OHIO.
Transient thermal effects in disc brakes
N80-13465
Transient thermal analysis of phase change material energy storage system
N80-13618
DEFENCE RESEARCH ESTABLISHMENT VALCARTIER [QUEBEC].
A purely chemical HBr laser
[AD-A060841] N80-13454
DEFENCE RESEARCH INFORMATION CENTRE, ORPINGTON [ENGLAND].
The propagation of VLF waves through the interior of the Earth
[DRIC-TRANS-5572] N80-13345
DEPARTMENT OF ENERGY, BARTLESVILLE, OKLA.
Physical properties of gasoline/alcohol automotive fuels
[CONF-790520-4] N80-13273
Driving cycle comparisons of energy economies and emissions from an alcohol and gasoline fueled vehicle
[CONF-790520-7] N80-13274
The 50,000 mile methanol/gasoline blend fleet study
[CONF-790520-6] N80-13275
DEPARTMENT OF ENERGY, OAK RIDGE, TENN.
Cogeneration opportunities
[CONF-7806118] N80-13681
DEPARTMENT OF ENERGY, WASHINGTON, D. C.
Environmental analysis of synthetic liquid fuels
[DOE/EV-0044] N80-13279
Commercialization strategy report for coal liquefaction
[TID-28846] N80-13285
Commercialization task force for high Btu gasification
[TID-28849] N80-13286
Underground coal conversion. Program description
[DOE/ET-0100] N80-13293
Time-dependent fracture of materials at elevated temperature
[CONF-790236] N80-13520
Summaries of physical research in the geosciences
[DOE/ER-0030] N80-13582
Current U. S. petroleum situation and short-term supply/demand outlook
[DOE/EIA-0184/5] N80-13607
Systems engineering for power, program report
[DOE/ET-0012/2-REV] N80-13637
Multi-year plan for thermal and mechanical energy storage program
[DOE/ET-0109] N80-13658
Solar thermal power systems
[DOE/ET-0078/T1] N80-13662
Photovoltaic systems. Program summary
[DOE/ET-0019/2] N80-13691
Environmental development plan: Wind energy conversion
[DOE/EDP-0030] N80-13701
Thin film problems and research in energy systems
[CONF-761168-SUMM] N80-13705
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BRUNSWICK [WEST GERMANY].
Beaver aircraft parameter identification: Technical preparations and preliminary results
[DFVLR-MITT-78-01] N80-13039
Evaluation of a simulation frame program for the EAI Pacer 600 hybrid-computer
[DFVLR-MITT-79-01] N80-13794
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, COLOGNE [WEST GERMANY].
Process chamber: Payload element of the German microgravity mission D 1
N80-13090
Stability of multicomponent mixtures under microgravity conditions
N80-13099
Overview of the future of the TEXUS program
N80-13123
The Geoscientific Airborne Remote Sensing Program
[BMFT-FB-W-78-31] N80-13608
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN [WEST GERMANY].
Large scale coherent structures in the wake of axisymmetric bodies
[DFVLR-FB-78-28] N80-13007
Industrial trial run of the AVA derivative balance on an Alphajet jet model in a 3 m windtunnel
[BMFT-FB-W-78-07] N80-13060
Flow phenomena in rotating floating zones with and without Marangoni convection
N80-13104
Space experiments on chemical pattern formation
N80-13109
Marangoni convection in a liquid layer subjected to rotation about a transverse axis
N80-13115
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, HARDTHAUSEN [WEST GERMANY].
Experimental investigation of a solid fuel ramjet
[DFVLR-FB-78-27] N80-13485
DORNIER-WERKE G.M.B.H., FRIEDRICHSHAFEN [WEST GERMANY].
A service system for material sciences experiments on Space Shuttle
N80-13089
Application of a tracking and Data Relay Satellite System [TDRSS] to European requirements
[BMFT-FB-W-78-37] N80-13131
Strategies for the surveillance of coastal waters of the Federal Republic of Germany
[BMFT-FB-M-77-11] N80-13726
Apparatus for measurement of tissue compliance
[BMFT-FB-W-78-05] N80-13768
DREXEL UNIV., PHILADELPHIA, PA.
Strain hardening and ductility of iron: Axisymmetric vs. plane strain elongation
[COO-4072-2] N80-13234
A functional simulation system for MSI and LSI systems
N80-13346
DU PONT DE NEMOURS [E. I.] AND CO., AIKEN, S. C.
In situ stress field in the southeastern United States and its implication
[DP-MS-78-95] N80-13733
Spent fuel receipt and lag storage facility for the spent fuel handling and packaging program
[DPSTD-SFHP-78-10] N80-13905
US program for the immobilization of high-level nuclear wastes
[DP-MS-79-2] N80-13917

E

EDGERTON, GERMESHAUSEN AND GRIER, INC., LAS VEGAS, NEV.
Development of an airborne gamma radiation system for snow surveys
[EGG-1183-1679] N80-13606
EFRATOM SYSTEMS CORP., IRVINE, CALIF.
An investigation of the technical feasibility of using pulsed optical pumping to eliminate the light shift and improve the longterm stability of passive rubidium frequency standards
[AD-A073757] N80-13925
EG AND G WASHINGTON ANALYTICAL SERVICES CENTER, RIVERDALE, MD.
A study of possible sea state information in the sample and hold gate statistics for the GEOS-3 satellite altimeter
[NASA-CR-156858] N80-13753
ELECTRIC POWER RESEARCH INST., PALO ALTO, CALIF.
Solar heating and cooling research projects: A summary
[EPRI-ER-1095-SR] N80-13703
ELECTRO MAGNETIC APPLICATIONS, INC., ALBUQUERQUE, N. MEX.
Receiving properties of the small annular slot antenna
[SAND-78-7067] N80-13342
ENGELHARD MINERALS AND CHEMICALS CORP., EDISON, N. J.
Design and development of a 30 watt solid polymer electrolyte fuel cell power source fueled with calcium hydride
[AD-A071157] N80-13625
ERNO RAUMFAHRTTECHNIK G.M.B.H., BREMEN [WEST GERMANY].
Functional performance of the isothermal heating facility for the material science double rack
N80-13091
Experiment modules and facilities in TEXUS 1 and 2
N80-13092
Experiment performance under zero-G using Small Self-Contained Payloads [SSCP] and other automatic equipment
N80-13122
Concept study of a shuttle-satellite in consideration of European satellite developments and launcher systems for the 1980's
[BMFT-FB-W-78-25] N80-13129
ESSEN UNIV. [WEST GERMANY].
Migration of gas bubbles under various force fields in a microgravitational environment
N80-13113
EUROPEAN SOUTHERN OBSERVATORY, MUNICH [WEST GERMANY].
Report on European astronomical and astrophysical activities
N80-13999
EUROPEAN SPACE AGENCY, PARIS [FRANCE].
Molecular two dimensional flow of mixtures of light and heavy gases with diffuse and specular reflection
[ESA-TT-508-REV] N80-13011
Experimental investigation of the local density and temperature distribution in the flow field around a sphere with high thermodynamic nonequilibrium using the electron beam technique
[ESA-TT-516-REV] N80-13012
The superposition of two-dimensional error fields and its influence on flight safety of air traffic
[ESA-TT-527-REV] N80-13022
Investigations on unsteady pressure distribution measurements in rotating systems
[ESA-TT-503-REV] N80-13059
Material sciences in space
[ESA-SP-142] N80-13069
Magnetospheric boundary layers
[ESA-SP-148] N80-13529
A new method for the design of recursive digital filters and its fields of application
[ESA-TT-530-REV] N80-13930
EUROPEAN SPACE TECHNOLOGY CENTER, NOORDWIJK [NETHERLANDS].
Magnetopause electric and magnetic field signatures at times of magnetospheric compressions
N80-13536
Radial discontinuities in low-energy magnetospheric plasma observed on GEOS-1
N80-13537

F

FARNHAM [FRANK C.] CO., PHILADELPHIA, PA.
Coalification reactions under pressure
[MLM-2556[TR]] N80-13284
FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D. C.
Installation criteria for the Approach Lighting System Improvement Program [ALSIP]
[AD-A070076] N80-13057
Comparative evalution of firefighting foam agents
[AD-A074490] N80-13253
FIAT RESEARCH CENTER, TURIN, ITALY.
Fabrication of composite materials under low gravity [experiment ES 310 of the First Spacelab Payload [FSLP]]
N80-13084
The fluid physics module: A contribution to materials science and physics in space
N80-13087
FLIGHT DYNAMICS RESEARCH CORP., VAN NUYS, CALIF.
High speed ejectors
[AD-A073378] N80-13051
FLORIDA INST. OF TECH., MELBOURNE.
Photosynthetic carbon reduction by seagrasses exposed to ultraviolet A radiation
[NASA-CR-160397] N80-13757
FLORIDA STATE UNIV., GAINESVILLE.
A large structure model of turbulence in two- dimensional jets
N80-13398
The influence of thermal fronts upon the solutions of an analytical model of a mid-latitude wave-cyclone
N80-13740
The importance of eddy momentum flux in the dynamics of a hurricane: A numerical approach
N80-13741
FLORIDA STATE UNIV., TALLAHASSEE.
Thermal shrinkage mechanisms of poly[ethylene terephthalate] fibers
N80-13246
Nonparametric families of life distributions. 1: Extreme points. Characteristics
N80-13859
Resistivity and hall coefficient measurements of iron doped niobium diselenide crystals
N80-13951
FLORIDA UNIV., GAINESVILLE.
Laser ignition of solid propellant formulations
[AD-A073316] N80-13270
University of Florida nuclear pumped laser program
N80-13439
Nuclear-pumped CO2 laser
N80-13440
Experimental setup for decomposition of UF6
N80-13441
CW nuclear pumped lasing of 3He-Ne
N80-13442
Spectral emission of nuclear excited XeBr*
N80-13443
Distribution and movement of electrolyte in fuel cells and batteries
N80-13619

FOM-INSTITUUT VOOR PLASMAFYSICA, JUTPHAAS [NETHERLANDS].
Solution of the initial value problem and energy redistribution for electron and Alfven waves in inhomogeneous plasmas
[REPT-78-115] N80-13945
FORSCHUNGSINSTITUT FUER ANTHROPOTECHNIK, MECKENHEIM [WEST GERMANY].
A field of view simulator equipped for perspective transformation on a television raster
[FB-34] N80-13775
On the optimization of spring elasticity, damping, and inertia effects on the spring loading of a control stick
[FB-37] N80-13776
A comparison of control simulators having force inputs and displacement feedback. Applications to the manual control of underwater vehicles
[FB-38] N80-13777
On the problem of spring loaded resistance to simple and complex positioning of a control stick
[FB-40] N80-13778
The automobile driving simulator for anthropogenic research
[FB-41] N80-13779
On the interaction between system and task parameters through continuous manual control
[FB-42] N80-13780
The use of a microprocessor for the manipulation and representation of large amounts of data on a color television monitor
[FB-39] N80-13795
FOSTER WHEELER CORP., LIVINGSTON, N.J.
Interim structural design standard for solar energy applications, phases 1 and 2
[SAND-79-8183] N80-13698
FRANKLIN PIERCE LAW CENTER, CONCORD, N. H.
Fundamental economic issues in the development of small-scale hydro
[DOE/RA-23-216.00.0-02] N80-13667
FREIBURG UNIV. [WEST GERMANY].
Preparatory experiments for the growth of silicon single crystals in the mirror heating facility of Spacelab
N80-13079
FULMER RESEARCH INST. LTD., STOKE POGES [ENGLAND].
The preparation and stability of metallic emulsions in a microgravity environment: An experiment for the First Spacelab Payload [FSLP]
N80-13081

G

GENERAL ACCOUNTING OFFICE, WASHINGTON, D. C.
The near-term potential of manufacturing in space
N80-13125
GENERAL ATOMIC CO., SAN DIEGO, CALIF.
Property changes in graphite irradiated at changing irradiation temperature
[GA-A-15270] N80-13178
MINT computer program for numerical computation of turbulent flow: An overview
[GA-A-15148] N80-13415
Recommendation of a triaxial failure theory for graphite
[GA-A-15333] N80-13521
GENERAL DYNAMICS CORP., GROTON, CONN.
Behavior of elastomeric materials under dynamic loads, 2
N80-13312
GENERAL ELECTRIC CO., CINCINNATI, OHIO.
Advanced catalytic combustors for low pollutant emissions, phase 1
[NASA-CR-159535] N80-13048
Feasibility of SiC composite structures for 1644 deg gas turbine seal applications
[NASA-CR-159597] N80-13474
GENERAL ELECTRIC CO., FAIRFIELD, CONN.
Solar power satellite system definition study. Volume 1, phase 1: Executive summary
[NASA-CR-160370] N80-13139
Solar power satellite system definition study. Volume 2, phase 1: Systems analyses tradeoffs.
[NASA-CR-160371] N80-13140
Solar power satellite system definition study. Volume 3: Reference system description, phase 1
[NASA-CR-160372] N80-13141
Solar power satellite system definition study. Volume 5, phase 1: Executive summary
[NASA-CR-160374] N80-13143
Solar power satellite system definition study. Volume 6, phase 1: Space construction and transportation
[NASA-CR-160375] N80-13144
Solar power satellite system definition study. Volume 7, phase 1: SPS and rectenna systems analyses
[NASA-CR-160376] N80-13145
GENERAL ELECTRIC CO., HOUSTON, TEX.
System parameters for erythropoiesis control model: Comparison of normal values in human and mouse model
[NASA-CR-160401] N80-13759
Analysis of metabolic energy utilization in the Skylab astronauts
[NASA-CR-160402] N80-13770
Skylab water balance error analysis
[NASA-CR-160403] N80-13771
GENERAL ELECTRIC CO., SANTA BARBARA, CALIF.
Large-scale annual-cycle thermal energy storage in aquifers
[CONF-790515-3] N80-13686
GENERAL ELECTRIC CO., SCHENECTADY, N. Y.
Lead zirconate titanate [LZT] ceramics
[AD-A073564] N80-13259
Requirements assessment of wind power plants in electric utility systems. Volume 3: Appendixes
[EPRI-ER-978-VOL-3] N80-13628
Application of inertia welding technology to steel disc-type flywheels
[UCRL-15045] N80-13652
Characterization of heat treatment induced changes in Li-NA beta-alumina single crystals
[CONF-790538-6] N80-13978
GENERAL ELECTRIC CO., ST. PETERSBURG, FLA.
Controlling the clean room atmosphere
[GEPP-OP-405] N80-13138
GEORGE WASHINGTON UNIV., WASHINGTON, D. C.
Characteristic parameters in combustion processes and their accessibility to current and future diagnostics
[ORO-5773-T1] N80-13197
A new weighting coefficient for adaptive state estimation
N80-13347
GEORGIA INST. OF TECH., ATLANTA.
Development of an electrical load demand and response model based on a rational synthesis from elementary devices
[DOE/ET-5109/1] N80-13371
Methods for factor screening in computer simulation experiments
[AD-A073449] N80-13824
GOULD, INC., ROLLING MEADOWS, ILL.
Assessment of technical and economic feasibility of zinc/bromine batteries for utility load leveling
[EPRI-EM-1059] N80-13659
GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.
Space fabrication demonstration system. Composite beam cap fabricator development, phase 1 and 2
[NASA-CR-161348] N80-13068
Solar power satellite system definition study. Volume 1, phase 1: Executive summary
[NASA-CR-160370] N80-13139
Solar power satellite system definition study. Volume 2, phase 1: Systems analyses tradeoffs.
[NASA-CR-160371] N80-13140
Solar power satellite system definition study. Volume 3: Reference system description, phase 1
[NASA-CR-160372] N80-13141
Solar power satellite system definition study. Volume 5, phase 1: Executive summary
[NASA-CR-160374] N80-13143
Solar power satellite system definition study. Volume 6, phase 1: Space construction and transportation
[NASA-CR-160375] N80-13144
Solar power satellite system definition study. Volume 7, phase 1: SPS and rectenna systems analyses
[NASA-CR-160376] N80-13145
Manufacturing cost data collection and analysis for composite production hardware
[AD-A073507] N80-13174
GUIDANCE SYSTEMS, INC., ANDOVER, MASS.
Overlapped sub-array scanning antenna study
[AD-A070939] N80-13339
GULF RESEARCH AND DEVELOPMENT CO., PITTSBURGH, PA.
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-33] N80-13287
Research and development of an advanced process for conversion of coal to synthetic gasoline and other distillate motor fuels
[FE-1800-30] N80-13291

H

HAMILTON STANDARD, WINDSOR LOCKS, CONN.
Advanced turbo-prop airplane interior noise reduction-source definition
[NASA-CR-159668] N80-13882
HANFORD ENVIRONMENTAL HEALTH FOUNDATION, RICHLAND, WASH.
Experimental study of hydrogen jet ignition and jet extinguishment
[HEDL-TME-78-80] N80-13198
HONEYWELL, INC., HOPKINS, MINN.
Development of two monolithic integrated circuits and a 10-kHz Tape Automated Bonded [TAB] hybrid microcircuit oscillator
[AD-A073565] N80-13368
HONEYWELL, INC., MINNEAPOLIS, MINN.
Active flutter control for flexible vehicles, volume 1
[NASA-CR-159160] N80-13053
Preliminary reference manual for the Green programming language: A language designed in accordance with the Ironman requirements
[AD-A073661] N80-13820
HUGHES AIRCRAFT CO., CULVER CITY, CALIF.
Equivalence principle as applied to conical arrays
[AD-A073384] N80-13335
HUGHES AIRCRAFT CO., NEWPORT BEACH, CALIF.
Design, processing and testing of LSI arrays, hybrid microelectronics task
[NASA-CR-161337] N80-13359
HUGHES RESEARCH LABS., MALIBU, CALIF.
Primary electric propulsion technology study
[NASA-CR-159688] N80-13158

I

IBM WATSON RESEARCH CENTER, YORKTOWN HEIGHTS, N.Y.
Study of the physics of insulating films as related to the reliability of metal-oxide semiconductor devices
[AD-A073300] N80-13364
IDAHO NATIONAL ENGINEERING LAB., IDAHO FALLS.
Horizontal two-phase flow transit time measurements
[CONF-790745-2] N80-13408
Drag devices for two-phase mass flow measurements
[CONF-790655-5] N80-13409
Pitot tube and drag body measurements in transient steam-water flows
[CONF-790505-15] N80-13416
Automated welding of nuclear piping systems
[CONF-790841-1] N80-13478
Analysis of binary thermodynamic cycles for a moderately low-temperature geothermal resource
[TREE-1365] N80-13627
X-ray and gamma ray transmission densitometry
[CONF-790692-1] N80-13910
Heat transfer in high-level waste management
[CONF-790822-1] N80-13919
ILLINOIS UNIV. AT CHICAGO CIRCLE, CHICAGO.
A theory of viscoelastic analogy for wave propagation in elastic and viscoelastic layered media
N80-13392
Extensions of a simple model with applications in reliability, extinction of species, inventory depletion and urn sampling
[AD-A073814] N80-13492
ILLINOIS UNIV. AT URBANA-CHAMPAIGN.
Application of rapid solidification techniques to aluminum alloys
[AD-A073443] N80-13223
ILLINOIS UNIV., URBANA.
University of Illinois nuclear pumped laser program
N80-13444
Nuclear pumping mechanisms in atomic carbon and in excimers
N80-13445
Interstitial-impurity trapping in Al-Fe and Al-Zn
[COO-1198-1267] N80-13975
IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON [ENGLAND].
The formation and properties of boundary layers downstream from neutral lines in an open magnetosphere
N80-13572
INCO RESEARCH AND DEVELOPMENT CENTER, SUFFERN, N. Y.
Characterization of an oxide dispersion strengthened superalloy, MA-6000E, for turbine blade applications
[NASA-CR-159493] N80-13218
INDIAN INST. OF TECH., KANPUR.
Some recent trends in aircraft flutter research
N80-13307
Structural optimization under shock and vibration environment
N80-13496
INFORMATION PLANNING ASSOCIATES, INC., GAITHERSBURG, MD.
The work request system of a NASA Q1 package
[NASA-CR-162511] N80-13982
INSTITUT D'AERONOMIE SPATIALE DE BELGIQUE, BRUSSELS.
A microscopic description of interpenetrated plasma regions
N80-13568
Impulsive penetration of solar wind and its effects on the upper atmosphere
N80-13576
INSTITUT FUER WELTRAUMFORSCHUNG, GRAZ [AUSTRIA].
Solution of the Chapman-Ferraro problem within two dimensions
N80-13569

INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE, PARIS [FRANCE].
Estimates of regional ET from HCMM data: Summary of 1977 experiment and final arrangement for 1978 in southeastern France test site
[E80-10018] N80-13597
INSTITUUT VOOR CULTURRTECHNIEK EN WATERHUISHOUDING, WAGENINGEN [NETHERLANDS].
Estimation of regional evapotranspiration and soil moisture conditions using remotely sensed crop surface temperatures
[REPT-1003] N80-13616
INSTITUTE FOR WATER RESOURCES, FORT BELVOIR, VA.
Wetland values concepts and methods wetlands evaluation
[AD-A069088] N80-13602
INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILL.
Research and development of rapid hydrogenation for coal conversion to synthetic motor fuels [riser cracking of coal]
[FE-2307-46] N80-13280
Preparation of a coal conversion systems technical data book, project 61003
[FE-2286-32] N80-13281
INSTITUTE OF HYDROLOGY, WALLINGFORD [ENGLAND].
The estimation of soil moisture content and actual evapotranspiration using thermal infra-red remote sensing
[E80-10021] N80-13599
INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS [BRAZIL].
A report on field work in the city of Paragominas [PA]
[E80-10001] N80-13587
INTERNATIONAL BUSINESS MACHINES CORP., HOPEWELL JUNCTION, N. Y.
Lifetime control in silicon through focused laser beam damage
[AD-A072909] N80-13455
INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS, ROME [ITALY].
Report of the fifth planning meeting for the Monsoon Experiment [MONEX]. Part 1: Winter MONEX
[GARP-SPEC-REPT-30] N80-13748
INTERNATIONAL TECHNOLOGY ASSOCIATES, INC., LONG BEACH, CALIF.
Photopolarimetry of scattering surfaces and their interpretation by computer model
[NASA-CR-162514] N80-14002
IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
Harmonic current propagation on AC systems due to HUDC links
N80-13326
Energy conservation via heat transfer enhancement
[COO-4649-4] N80-13707
IOWA UNIV., IOWA CITY.
Optimal design of open-linkage mechanical systems
N80-13469
Design sensitivity analysis and optimization of constrained dynamic systems
N80-13470
Dynamic analysis of flexible mechanisms
N80-13502
Numerical solution of two-dimensional potential theory problems using integral equation techniques
N80-13835
ISRAEL INST. OF TECH., HAIFA.
Electronmicroscopic study of sand erosion processes in metals
[AD-A073497] N80-13220
ITT ELECTRO-OPTICAL PRODUCTS DIV., ROANOKE, VA.
Aviation night vision goggle
[AD-A073296] N80-13773

J

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
Nuclear pumped laser research at the Jet Propulsion Laboratory
N80-13450
Jupiter's magnetopause
N80-13558
JOHNS HOPKINS UNIV., BALTIMORE, MD.
Centrifugal instability of decelerating swirl-flow within finite and infinite circular cylinders
N80-13391
The effects of context on the structure of pain
N80-13761
On congruence subgroup problem and related topics
N80-13873
JOHNS HOPKINS UNIV., LAUREL, MD.
Particle and field characteristics of the dayside magnetopause energetic electron layer
N80-13546
JUSTUS LIEBIG-UNIVERSITAET, GIESSEN [WEST GERMANY].
Steady and oscillatory Marangoni convection in floating zones under 1g
N80-13111

K

KAMAN AEROSPACE CORP., BLOOMFIELD, CONN.
Design assessment of advanced technology lightweight, low-cost mission-configured gondola modules
[AD-A073554] N80-13029
KANSAS UNIV., LAWRENCE.
Biological transformation of light energy into methane using an anaerobic filter
N80-13267
Design and fabrication on microstrip disk antenna arrays
N80-13328
Evaluation of surface aerator applications in the activated sludge process
N80-13987
KARLSRUHE UNIV. [WEST GERMANY].
Numerical and experimental simulation of microgravity-convection
N80-13112
KARNATAKA UNIV., DHARWAR [INDIA].
Evaluation of methanol for reduced exhaust emissions in a single-cylinder research engine
[CONF-790520-3] N80-13276
KENTUCKY UNIV., LEXINGTON.
A new equilibrium finite element analysis of stresses in orthotropic cylinders with temperature dependent material properties
N80-13506
Hertzian fracture of Pyrex glass and alpha quartz
N80-13510
Infinite server queuing systems with renewal clearing and related models
N80-13832
Control kernels and constant-rate jump processes
N80-13836
Duality theory, stochastic realization and invariant directions for linear discrete-time stochastic systems
N80-13858
KIRUNA GEOPHYSICAL INST. [SWEDEN].
First observations of a heated plasma component in the plasma mantle
N80-13538
First observations of the hot ion composition in the high altitude magnetospheric boundary layer by means of Prognoz-7
N80-13539
KOBE UNIV. [JAPAN].
Stability problems on rotor systems
N80-13301
KRUPP [FRIED.] G.M.B.H., RHEINHAUSEN [WEST GERMANY].
Examination and selection of suitable methods for measuring the thermal conductivity of liquids in Spacelab
[BMFT-FB-W-78-09] N80-13207

L

LEE [J. S.] ASSOCIATES, INC., ARLINGTON, VA.
Error performance of differentially coherent detection of binary DPSK data transmission on the hard-limiting satellite channel
[AD-A073377] N80-13337
LEITZ [ERNST] G.M.B.H., WETZLAR [WEST GERMANY].
Manufacturing of oxide glasses. Critical comment on proposals for melting and solidification experiments under zero-g conditions
[BMFT-FB-W-78-06] N80-13127
LILLE UNIV. [FRANCE].
Atmospheric correction of surface temperature measurements in a 10.5 to 12.5 micron channel from AVHRR/TIROS-N
N80-13739
LINCOLN LAB., MASS. INST. OF TECH., LEXINGTON.
The Aircraft Reply and Interference Environment Simulator [ARIES]. Volume 3: Programmer's manual
[AD-A074424] N80-13017
Classification and technical review of dc-ac inverters for use in photovoltaic power systems
[COO-4094-25] N80-13377
Evaluation of combined photovoltaic/thermal collectors
[COO-4577-8] N80-13665
Cost analysis of packed beds for thermal energy storage
[CAES-11] N80-13687
Test plan for the Mead 25-kW Photovoltaic Flexible Test Facility, 1979
[COO-4094-53] N80-13692
Novel ceramic receiver for solar Brayton systems
[COO-4878-3] N80-13694
Programmable Video Digitizing System [PVDS]. Functional description and preliminary software considerations
[AD-A073756] N80-13822
LINCOM CORP., PASADENA, CALIF.
Shuttle GPS R/PA configuration and specification study
[NASA-CR-160396] N80-13360
LITTLE [ARTHUR D.], INC., CAMBRIDGE, MASS.
Experiments on the stability of conical and cylindrical liquid columns at low Bond numbers
N80-13110
Solar power satellite system definition study. Volume 1, phase 1: Executive summary
[NASA-CR-160370] N80-13139
Solar power satellite system definition study. Volume 2, phase 1: Systems analyses tradeoffs.
[NASA-CR-160371] N80-13140
Solar power satellite system definition study. Volume 3: Reference system description, phase 1
[NASA-CR-160372] N80-13141
Solar power satellite system definition study. Volume 5, phase 1: Executive summary
[NASA-CR-160374] N80-13143
Solar power satellite system definition study. Volume 6, phase 1: Space construction and transportation
[NASA-CR-160375] N80-13144
Solar power satellite system definition study. Volume 7, phase 1: SPS and rectenna systems analyses
[NASA-CR-160376] N80-13145
LOCKHEED ELECTRONICS CO., HOUSTON, TEX.
Spacelab interface development test, volume 1, sections 1-6
[NASA-CR-160411] N80-13149
Investigation of high frequency oscillations in the OV102 elevon actuation subsystems using continuous system modeling program simulation
[NASA-CR-160407] N80-13151
Large Area Crop Inventory Experiment [LACIE]. Experiment plan for evaluation of LANDSAT agronomic variables using wheat intensive test sites
[E80-10010] N80-13589
Large Area Crop Inventory Experiment [LACIE]. Evaluation of the LACIE transition year crop calendar model
[E80-10011] N80-13590
Large Area Crop Inventory Experiment [LACIE]. List spectral keys study
[E80-10012] N80-13591
Earth observations division Earth resources data analysis capabilities
[E80-10013] N80-13592
Large Area Crop Inventory Experiment [LACIE]. Phase 3 direct wheat study of North Dakota
[E80-10014] N80-13593
Large Area Crop Inventory Experiment [LACIE]. Phase 3 labeling error characterization
[E80-10015] N80-13594
Large Area Crop Inventory Experiment [LACIE]. A revised screening procedure for LACIE phase 3 data in the US Great Plains
[E80-10016] N80-13595
Texas applications system verification and transfer remote sensing information subsystem: Functional design
[E80-10017] N80-13596
Spacelab interface development tests. Software description
[NASA-CR-160394] N80-13815
As-built design specification for CAMS Development Dot Data System [CDDDS]
[NASA-CR-160395] N80-13816
LOCKHEED MISSILES AND SPACE CO., PALO ALTO, CALIF.
Hygrothermal damage mechanisms in graphite-epoxy composites
[NASA-CR-3189] N80-13170
Ion composition in the Dayside Cusp: Injection of ionospheric ions into the high latitude boundary layer
N80-13553
LOCKHEED MISSILES AND SPACE CO., SUNNYVALE, CALIF.
OTEC system response and control analysis
[CONF-790631-2] N80-13657
LOGICON, INC., SAN PEDRO, CALIF.
Reliable microprogramming
[AD-A073454] N80-13826
LOS ALAMOS SCIENTIFIC LAB., N. MEX.
Effects of rocket exhaust products in the thermosphere and ionosphere
[LA-7926-MS] N80-13167
Synfuel [hydrogen] production from fusion power
[LA-UR-79-1115] N80-13296
Liquid hydrogen as an automotive fuel
[LA-UR-79-621] N80-13297
Effect of deviations from the Maxwell distribution on neutron production in laser targets
[LA-7532-MS] N80-13460
Finite element linear models for symmetrically loaded thin shells of revolution
[LA-UR-79-1321] N80-13515
Energy policy and decision analysis; new concepts and mechanisms
[LA-7909-MS] N80-13634
Energy planning with solar and conservations: Individual values and community choice
[LA-UR-79-1599] N80-13653
Hot dry rock geothermal energy development program
[LA-7807-HDR] N80-13673
Conceptual designs for two reject heat systems for a Brayton closed-cycle converter
[LA-7821-MS] N80-13677

Critical review and assessment of environmental and safety problems in hydrogen energy systems
[LA-7820-PR] N80-13690
Application of the boson polynomials of u[n] to physical problems
[LA-UR-78-2395] N80-13850
Contributions of shock-wave physics to high-pressure standards
[LA-UR-79-2039] N80-13875
Multiple-photon excitation of polyatomic molecules in a strong optical field: A universal normalization
[LA-UR-79-1524] N80-13896
Baseline design of the thermoelectric reactor space power system
[LA-UR-79-1242] N80-13906
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7952-PR] N80-13911
Transfer map approach to the beam-beam interaction
[LA-UR-79-1752] N80-13913
Nonlinear optics: Parametric amplification at 16 micrometers and oscillator mode competition
[LA-7850-T] N80-13927
Broadly tunable picosecond IR source
[LA-UR-79-1474] N80-13928
Photonic compression
[LA-UR-79-2040] N80-13973

LOUGHBOROUGH UNIV. OF TECHNOLOGY [ENGLAND].
Wind excited behavior of structures, 2
N80-13305

LOUISIANA STATE UNIV. AND A&M COLL., BATON ROUGE.
An explicit state model of a synchronous machine - transformer - SCR bridge unit
N80-13357

M

MARBURG UNIV. [WEST GERMANY].
Manufacturing of oxide glasses. Critical comment on proposals for melting and solidification experiments under zero-g conditions
[BMFT-FB-W-78-06] N80-13127

MARYLAND UNIV., COLLEGE PARK.
Physical processes affecting the performance of high-power, frequency-doubled short-pulse laser systems: Analysis, simulation, and experiment
N80-13437
Heuristic approaches to the decomposition of sparse matrices
N80-13810
The construction of spacetimes from initial data
N80-13870
Transfer map approach to the beam-beam interaction
[LA-UR-79-1752] N80-13913
Electromagnetic lower hybrid instabilities in an inhomogeneous plasma
N80-13934
Evaluation and application of an intensified CCD array photometer for astronomical observations
N80-13995

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Loss of lattice rigidity in austenite
[AD-A073280] N80-13221
Stress-assisted isothermal martensitic transformation and transformation plasticity
[AD-A073433] N80-13222
Dynamic behavior of shortest path routing algorithms for communication networks
[AD-A073487] N80-13338
Ultrasonic attenuation as an indicator of fatigue life of graphite/epoxy fiber composite
[NASA-CR-3179] N80-13488
Ultrasonic attenuation and velocity in AS/3501-6 graphite/epoxy fiber composite
[NASA-CR-3180] N80-13489
Use of virtual machines in the development of decision support systems
[AD-A073748] N80-13792
Relation of ultrasonic energy loss factors and constituent properties in unidirectional composites
[NASA-CR-3181] N80-13878

MASSACHUSETTS UNIV., AMHERST.
Dynamic plastic buckling of shells: A reconsideration of the Vaughan-Florence analysis
[CONF-790802-1] N80-13518

MATERIALS RESEARCH LABS., ASCOT VALE [AUSTRALIA].
The parachor and the P yields O bond
[AD-A073410] N80-13168
A thermogravimetric system for investigating gas-metal reactions at elevated temperatures
[AD-A073412] N80-13194

MAX-PLANCK-INSTITUT FUER AERONOMIE, LINDAU UBER NORTHEIM [WEST GERMANY].
Ion and electron layers at the magnetopause: ISEE-2
N80-13545
Variations of electron and ion distributions during dayside magnetopause crossings of GEOS-2
N80-13548
Multiple-satellite observations of large scale trapping boundary motions
N80-13549
STARE ionospheric electron flows during the August 28, 1978 GEOS-2 magnetopause crossing
N80-13552
Interaction between the magnetospheric boundary layers and the ionosphere
N80-13579
Studies on the thermosphere and ionosphere based on a detailed analysis of topside ionograms
[BMFT-FB-W-78-01] N80-13736

MAX-PLANCK-INSTITUT FUER EXTRATERRESTRISCHE PHYSIK, GARCHING [WEST GERMANY].
Plasma structure of the magnetopause and boundary layer
N80-13532
External plasma flow
N80-13533
Theory of the low attitude boundary layer
N80-13580

MAX-PLANCK-INSTITUT FUER PHYSIK UND ASTROPHYSIK, GARCHING [WEST GERMANY].
The nuclear and ionic charge distribution particle experiments on the ISEE-1 and ISEE-C spacecraft
[BMFT-FB-W-78-38] N80-13132
Contributions to the Fourth Solar Wind Conference
[MPI-PAE/EXTRATERR-154] N80-14008
Ion sound turbulence in the solar wind
N80-14009
Initial results on solar wind alpha particle distributions as measured by Helios between 0.3 and 1 AU
N80-14010
Some characteristics of proton velocity distributions in the solar wind as observed by the Helios solar probes
N80-14011
Electron characteristics in the solar wind as deduced from Helios observations
N80-14012
Two states of the solar wind at the time of minimum solar activity. Part 1: Boundary layers between fast and slow streams
N80-14013
Two states of the solar wind at the time of minimum solar activity. Part 2: Radial gradients of plasma parameters in fast and slow streams
N80-14014

MAX-PLANCK-INSTITUT FUER PHYSIK UND ASTROPHYSIK, MUNICH [WEST GERMANY].
Instabilities of accretion disk: Magnetosphere interfaces
N80-13562
Interaction of accretion disk and rotating magnetic field of neutron star
N80-13563

MCALVERY AND ASSOCIATES, HOBOKEN, N. J.
Impact of flywheel-transmissions on automobile performance: A logical basis for evaluation
[UCRL-52758] N80-13480

MCDONNELL-DOUGLAS ASTRONAUTICS CO., HUNTINGTON BEACH, CALIF.
Life science payloads planning study integration facility survey results
[NASA-CR-160390] N80-13064
Life science payloads planning study integration facility survey: Executive summary
[NASA-CR-160391] N80-13065
Solar central receiver prototype heliostat CDRL item B.D., volume 1
[SAN-1605/7-VOL-1] N80-13700

MCDONNELL-DOUGLAS ASTRONAUTICS CO., ST. LOUIS, MO.
Reliability test and evaluation of MIL-M-38510 linear microcircuits
[AD-A073455] N80-13363
Optical digital techniques
[NASA-CR-160392] N80-13922

MCDONNELL-DOUGLAS RESEARCH LABS., ST. LOUIS, MO.
Magnetic resonance studies of epoxy resins and polyurethanes
[AD-A073590] N80-13173

MECHANICAL TECHNOLOGY, INC., LATHAM, N. Y.
Assessment of the state of technology of automotive Stirling engines
[NASA-CR-159631] N80-13989

MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., MUNICH [WEST GERMANY].
System definition study for a German contribution to the Jupiter Orbiter Probe project
[BMFT-FB-W-78-24] N80-13128
Standardization of boom systems for sounding rocket experiments
[BMFT-FB-W-78-40] N80-13147
Spacelab environment investigation by mass spectrometer
[BMFT-FB-W-78-02] N80-13774

MIAMI UNIV., CORAL GABLES, FLA.
LaRC results on nuclear pumped noble gas lasers
N80-13446

MICHIGAN STATE UNIV., EAST LANSING.
Dissolved organic matter and lake metabolism
[COO-1599-153-PT-1] N80-13604

MICHIGAN UNIV., ANN ARBOR.
Fracture toughness of graphite/epoxy composite laminates enhanced by the intermittent interlaminar bonding strength
N80-13169
Characteristics of TRAPATT amplifiers
N80-13349
A structured logical database design methodology, volumes 1 and 2
N80-13781

MIDWEST RESEARCH INST., GOLDEN, COLO.
Solar energy perspectives for public power
[SERI/TP-35-300] N80-13635
Review of the environment effects and benefits of selected solar energy technologies
[SERI/TP-53-114R] N80-13649
Technology development needs for high temperature process heat
[SERI/TR-35-047] N80-13669
Wind energy innovative systems
[SERI/PR-13-054] N80-13674
Review of solar energy
[SERI/TR-54-066] N80-13699

MINNESOTA UNIV., MINNEAPOLIS.
Optical reflectance studies of adsorption and reaction on platinum
N80-13183
Several aspects of dynamic behavior in nonlinear mathematical models of chemical reaction and diffusion
N80-13186
Analysis of the anode boundary layer of a high pressure-high current arc
N80-13358
The gradient theory of fluid interfaces
N80-13394
Phase behavior and interfacial tension studies of surfactant systems
N80-13395
New methods for quantum mechanical calculations of inelastic atom-molecule collisions and electron scattering
N80-13892

MISSION RESEARCH CORP., ALBUQUERQUE, N. MEX.
Experimental methods for the characterization of multiconductor cable systems
[AD-A073767] N80-13366

MISSISSIPPI STATE UNIV., STATE COLLEGE.
Evaluation of polar and non-polar plastics compounded with thermomechanical wood fibers
N80-13247
The analysis of sediment samples for hydrocarbons
[AD-A073822] N80-13754

MISSOURI UNIV. -KANSAS CITY.
Evaluation of integrals whose integrands are oscillatory and singular
N80-13838

MONSANTO RESEARCH CORP., MIAMISBURG, OHIO.
Coalification reactions under pressure
[MLM-2556[TR]] N80-13284

MONTANA STATE UNIV., MISSOULA.
A intrusive slotted cylinder antenna array for subsurface moisture profiling
N80-13323

MOTOREN- UND TURBINEN-UNION MUENCHEN G.M.B.H. [WEST GERMANY].
Skin technology
N80-13083

MOUND LAB., MIAMISBURG, OHIO.
Coalification reactions under pressure
[MLM-2556[TR]] N80-13284

MUELLER ASSOCIATES, INC., BALTIMORE, MD.
Status of alcohol fuels utilization technology for stationary gas turbines
[HCP/M2098-03] N80-13283

N

NAPLES UNIV. [ITALY].
Thermodynamics and dynamics of line phases
N80-13105
Marangoni boundary layers
N80-13114

NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA [ONTARIO].
Application of finite element programs APES, ASAS and MARC to linear fracture mechanics
[LTR-ST-1118] N80-13511

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C.
Earth resources. A continuing bibliography with indexes, issue 23
[NASA-SP-7041[23]] N80-13585
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 199
[NASA-SP-7011[199]] N80-13762
Mathematical Modeling of Diverse Phenomena
[NASA-SP-437] N80-13839

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
In depth review of the 1979 AIAA Lighter-Than-Air Systems Technology Conference
[NASA-TM-81158] N80-12991

Force and moment data from a wind-tunnel test of a tilt-nacelle V/STOL propulsion system with an attitude control vane
[NASA-TM-81157] N80-13003
Flight test of navigation and guidance sensor errors measured on STOL approaches
[NASA-TM-81154] N80-13041
Fire-resistant materials for aircraft passenger seat construction
[NASA-TM-78617] N80-13255
Operational procedures for ground station operation: ATS-3 Hawaii-Ames satellite link experiment
[NASA-TM-81155] N80-13333

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. HUGH L. DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIF.

Effects of fuselage forebody geometry on low-speed lateral-directional characteristics of twin-tail fighter model at high angles of attack
[NASA-TP-1592] N80-13002
Friction characteristic of steel skids equipped with skegs on a lakebed surface
[NASA-TM-81347] N80-13027
Extreme mean and its applications
[NASA-TM-81346] N80-13863

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.

A digital computer program for the dynamic interaction simulation of controls and structure [DISCOS]. Volume 4: Supplementary documentation
[NASA-TM-80546] N80-13150
Global aspects of the Earth's magnetopause N80-13530
Electromagnetic structure of the magnetopause and boundary layer N80-13581
Dominant partition method
[NASA-TM-80778] N80-13851

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.

Star tracker error analysis: Roll-to-pitch nonorthogonality
[NASA-TM-80835] N80-13134
Parametric study of the Orbiter rollout using an approximate solution
[NASA-TM-80837] N80-13148
OPS MCC level B/C formulation requirements: Area targets and space volumes processor
[NASA-TM-80839] N80-13840
Analysis of numerical stability and amplification matrices: Fourth-order Runge-Kutta methods
[NASA-TM-80836] N80-13841

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.

Summary of low-speed longitudinal aerodynamics of two powered close-coupled wing-canard fighter configurations
[NASA-TP-1535] N80-12994
Inclusion of unsteady aerodynamics in longitudinal parameter estimation from flight data
[NASA-TP-1536] N80-12995
Transonic aerodynamic characteristics of a supersonic cruise aircraft research model with the engines suspended above the wing
[NASA-TM-80145] N80-12997
Aerodynamic characteristics of wheelchairs
[NASA-TM-80191] N80-12999
Supersonic stability and control characteristics of a cruciform missile model with delta wings and aft tail fin control
[NASA-TM-80171] N80-13000
Investigation of flow characteristics over missile bodies at supersonic speeds
[NASA-TP-1579] N80-13001
Wear, friction, and temperature characteristics of an aircraft tire undergoing braking and cornering
[NASA-TP-1569] N80-13013
Experimental determination of position-estimate accuracy using back-azimuth signals from a microwave landing system
[NASA-TP-1574] N80-13020
Application of modified profile analysis to function testing of the motion/no-motion issue in an aircraft ground-handling simulation
[NASA-TP-1540] N80-13024
Analytical investigation of the landing dynamics of a large airplane with a load-control system in the main landing gear
[NASA-TP-1555] N80-13025
Exploratory study of the effects of wing-leading-edge modifications on the stall/spin behavior of a light general aviation airplane
[NASA-TP-1589] N80-13026
Effects of relaxed static longitudinal stability on a single-stage-to-orbit vehicle design
[NASA-TP-1594] N80-13052
Two-impulse reorientation of asymmetric spacecraft
[NASA-TP-1554] N80-13135
Flight Technology Improvement
[NASA-CP-2101] N80-13152
Summary of the Flight Technology Improvement Workshop N80-13153
Report of Optical Radiometric Instruments and Calibration Panel N80-13154
Report of the Electromechanical Subsystems Panel N80-13155
Report of the Power Sub systems Panel N80-13156
Report of the Attitude Control and Attitude Determination Panel N80-13157
Effect of pressure on structure and NO sub X formation in CO-air diffusion flames
[NASA-TP-1448] N80-13191
Aerothermal performance of radiatively and actively cooled panel at Mach 6.6
[NASA-TP-1595] N80-13402
A low energy electron magnetometer
[NASA-TM-80172] N80-13429
Instrument error analysis as it applies to wind-tunnel testing
[NASA-TP-1572] N80-13430
Nuclear-Pumped Lasers
[NASA-CP-2107] N80-13438
Nuclear excitation of CO2 and CO N80-13447
Nuclear pumped laser modeling N80-13448
Analysis of surface cracks in finite plates under tension or bending loads
[NASA-TP-1578] N80-13512
An asymptotic expansion approach to the inverse radiative transfer problem
[NASA-TP-1587] N80-13730
Effect of noise spectra and a listening task upon passenger annoyance in a helicopter interior noise environment
[NASA-TP-1590] N80-13769
Experimental study of acoustic loads on an upper-surface-blown STOL airplane configuration
[NASA-TP-1577] N80-13879
Effects of sound level fluctuations on annoyance caused by aircraft-flyover noise
[NASA-TP-1576] N80-13880

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.

Flutter spectral measurements using stationary pressure transducers
[NASA-TM-79293] N80-13046
Atomizing characteristics of swirl can combustor modules with swirl blast fuel injectors
[NASA-TM-79297] N80-13047
Hg ion thruster component testing
[NASA-TM-79287] N80-13159
Design and evaluation of high performance rocket engine injectors for use with hydrocarbon fuels
[NASA-TM-79319] N80-13163
Improved fiber retention by the use of fillers in graphite fiber/resin matrix composites
[NASA-TM-79288] N80-13171
Characterization and properties of controlled nucleation thermochemical deposited [CNTD] silicon carbide
[NASA-TM-79277] N80-13254
Reactions of calcium orthosilicate and barium zirconate with oxides and sulfates of various elements
[NASA-TM-79272] N80-13256
Temperature and flow measurements on near-freezing aviation fuels in a wing-tank model
[NASA-TM-79285] N80-13268
Evaluation of cleaners for photovoltaic modules exposed in an outdoor environment
[NASA-TM-79248] N80-13317
Performance of 22.4-kW nonlaminated-frame dc series motor with chopper controller
[NASA-TM-79252] N80-13361
Marangoni bubble motion in zero gravity
[NASA-TM-79250] N80-13403
Combustion of solid carbon rods in zero and normal gravity
[NASA-TM-79303] N80-13404
Investigation into the effect of plasma pretreatment on the adhesion of parylene to various substrates
[NASA-TM-79224] N80-13473
Modified aerospace reliability and quality assurance method for wind turbines
[NASA-TM-79284] N80-13490
Comparison tests and experimental compliance calibration of the proposed standard round compact plane strain fracture toughness specimen
[NASA-TM-81379] N80-13513
Modified power law equations for vertical wind profiles
[NASA-TM-79275] N80-13623
Low NO[x] heavy fuel combustor program
[NASA-TM-79313] N80-13624
An analytical study of nitrogen oxides and carbon monoxide emissions in hydrocarbon combustion with added nitrogen, preliminary results
[NASA-TM-79296] N80-13721
Assessment at full scale of exhaust nozzle to wing size on STOL-OTW acoustic characteristics
[NASA-TM-79279] N80-13881

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.

Engineering evaluation of existing space hardware for utilization in small self-contained payloads N80-13094
Sample stream distortion modeled in continuous-flow electrophoresis
[NASA-TM-78178] N80-13192
Development and evaluation of an ablative closeout material for solid rocket booster thermal protection system
[NASA-TM-78241] N80-13258
Development of mining guidance and control systems
[NASA-TM-78226] N80-13601

NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER, ATLANTIC CITY, N. J.

Exhaust emissions characteristics for a general aviation light aircraft Teledyne Continental Motors 6-285-B piston engine
[AD-A074338] N80-13042

NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.

Comparison of centrifuge and freezing calorimeter methods for measuring free water in snow
[NASA-CR-162504] N80-13319

NATIONAL CLIMATIC CENTER, ASHEVILLE, N. C.

National wind data index
[HCP/T1041-01] N80-13745

NATIONAL ENGINEERING LAB., EAST KILBRIDE [SCOTLAND].

Air flow measurements in a large irregularly shaped tunnel using anemometer and pitot-static tube traverse
[NEL-660] N80-13061
An investigation of multi-axial creep characteristics of metals
[NEL-661] N80-13242
Energy saving in injection molding
[NEL-662] N80-13318
Condensor operated inverse thermosiphons
[NEL-659] N80-13422

NATIONAL GAS TURBINE ESTABLISHMENT, PYESTOCK [ENGLAND].

A review of the research at NGTE concerning the effects of flight on engine exhaust noise
[NGTE-R-78007] N80-13887

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.

Automated prediction of boundary layer winds and turbulence for the Savannah River Laboratory
[NOAA-TR-NWS-1007-1] N80-13746

NATIONAL PHYSICAL LAB., TEDDINGTON [ENGLAND].

British Post Office VIEWDATA interfacing to a data communication network
[NPL-DNACS-1/78] N80-13343

NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.

Computer aided design of microcircuits. Citations from the NTIS data base
[NTIS/PS-79/0870/0] N80-13388
Computer aided design of microcircuits. Citations from the Engineering Index data base
[NTIS/PS-79/0871/8] N80-13389
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-79/0851/0] N80-13425
Numerical methods in fluid flow problems, volume 5. A bibliography with abstracts
[NTIS/PS-79/0852/8] N80-13426
Remote sensing applied to geology and mineralogy. A bibliography with abstracts
[NTIS/PS-79/0844/5] N80-13612
Remote sensing applied to environmental pollution detection and management. A bibliography with abstracts
[NTIS/PS-79/0842/9] N80-13614
Remote sensing applied to urban and regional planning. A bibliography with abstracts
[NTIS/PS-79/0843/7] N80-13615
Geothermal energy. Part 1: Exploration, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0814/8] N80-13715
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0815/5] N80-13716
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-79/0816/3] N80-13717
Geothermal energy, volume 3. Citations from the Engineering Index data base
[NTIS/PS-79/0818/9] N80-13718
Geothermal energy. Part 3: Technology and general studies, volume 4. Citations from the NTIS data base
[NTIS/PS-79/0817/1] N80-13719
Geothermal energy, volume 4. Citations from the Engineering Index data base
[NTIS/PS-79/0819/7] N80-13720

NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.

A computerized VSTOL/small platform landing dynamics investigation model
[AD-A073587] N80-13033

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.

Least squares, adaptive-lattice algorithms
[AD-A073464] N80-13846

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.

Tropical disturbances in an oceanic general circulation model with seasonal forcing
[AD-A073602] N80-13756

Experimental FLIR study
[AD-A073361] N80-13926
NAVAL RESEARCH LAB., WASHINGTON, D. C.
A numerical solution for rocket ascent trajectory
[AD-A073346] N80-13166
Application of coatings by high energy CW lasers
[AD-A073347] N80-13456
Numerical simulation of sudden stratospheric warnings
[NASA-CR-162505] N80-13744
Using intelligent graphics terminals in real-time processing
[AD-A073760] N80-13823
NAVAL UNDERWATER SYSTEMS CENTER, NEW LONDON, CONN.
A survey of finite element-related techniques as applied to acoustic propagation in the ocean. Part 1: Finite element method and related techniques
N80-13300
A survey of finite element-related techniques as applied to acoustic propagation in the ocean. Part 2: Transparent boundary simulation techniques
N80-13304
NEW MEXICO UNIV., ALBUQUERQUE.
Remotely piloted vehicles. Citations from the International Aerospace Abstracts data base
[NTIS/PS-79/0875/9] N80-13040
Remote sensing applied to geology. Citations from the International Aerospace Abstracts data base
[NTIS/PS-79/0822/1] N80-13613
NEW YORK UNIV., N. Y.
Expression continuity and the formal differentiation of algorithms
N80-13797
Comparison of direct code generation and intermediate language generation for bootstrapping the machine-independent compiler, LITTLE
N80-13798
NORTH CAROLINA STATE UNIV. AT RALEIGH.
Parallel interactive processing in shaded color graphics
N80-13801
NORTH CAROLINA STATE UNIV., RALEIGH.
Kinetics of a CO2 nuclear pumped laser
N80-13449
NORTH CAROLINA UNIV. AT CHAPEL HILL.
Building efficient pass-oriented attribute grammar evaluators
N80-13796
Queues and stores with nonhomogeneous input
N80-13830
A starting rule for data collection in queueing simulations
[AD-A073622] N80-13842
A stopping rule for data collection in queueing simulations
[AD-A073624] N80-13843
Systems of frequency curves generated by transformations of logistic variables
[AD-A073481] N80-13847
Extreme sample censoring problems with multivariate data, 2
[AD-A073563] N80-13848
NORTHEASTERN UNIV., BOSTON, MASS.
A fluid mechanical-kinetic theory description of a spherically symmetric discharge in a neutral medium
N80-13464
Adaptive algorithms for reduction of interchannel and intersymbol interference in digital communications
N80-13807
NORTHROP RESEARCH AND TECHNOLOGY CENTER, PALOS VERDES PENINSULA, CALIF.
Investigation of advanced prognostic analysis techniques
[AD-A073553] N80-13032
NORTHROP SERVICES, INC., HUNTSVILLE, ALA.
Solar-climactic statistical study
[HCP/T4016-01/2] N80-13747
NORTHWESTERN UNIV., EVANSTON, ILL.
Catalyst deactivition and fixed bed reactor modeling
N80-13181
Theoretical studies on heterogeneous combustion
[COO-4433-2] N80-13200
Cyclic creep behavior of pure aluminum and 7050 aluminum alloy
N80-13214
The elastic modulus and diffusion coefficents of silver-palladium composition modulated foils
N80-13216
A new thermal conductivity apparatus for small conducting specimens and measurememts on niobium monoxide
N80-13428
Elastodynamic diffraction and radiation problems
N80-13505
Initiation and growth of fatigue microcracks and strain-controlled fatigue properties in steel alloys: Microstructure and mechanics
N80-13508
The fate of dissolved aluminum within the oceans
N80-13586
Effect of program modifications on software performance
N80-13806
On some graph-theoretic problems in program testing
N80-13811
Auditory detection of bandpass-filtered impulses under various conditions of masking
N80-13877
Effect of electron irradiation on the strength of niobium single crystals
N80-13961
NOTRE DAME UNIV., IND.
Measurement of the electrical properties of composite materials in the frequency range of DC to 30 MHz
[AD-A073638] N80-13175

O

OAK RIDGE NATIONAL LAB., TENN.
Effect of phase instabilities on the correlation of nickel ion and neutron irradiation swelling in solution annealed 316 stainless steel
[CONF-790657-2] N80-13226
Elevated temperature exposure has significant effects on the structure of austenitic stainless steel welds
[CONF-790736-1] N80-13232
Analytical electron microscope study of the omega phase transformation in a zirconium-nobium alloy
[ORNL/TM-6705] N80-13240
Model studies of mixed-ion beta-aluminas
[CONF-790538-8] N80-13265
Review of supporting research at Oak Ridge National Laboratory for underground coal conversion
[CONF-790630-9] N80-13295
INCAP: A finite element program for one-dimensional nonlinear inverse heat conduction analysis
[ORNL/NUREG/CSD/TM-8] N80-13407
Condensation and evaporation heat transfer with low-boiling temperature fluids
[CONF-790539-1] N80-13412
Two-phase flow measurements with advanced instrumented spool pieces and local conductivity probes
[CONF-790745-1] N80-13413
Optimization of an analytical electron microscope for X-ray microanalysis: Instrumental problems
[CONF-790418-6] N80-13432
Statistical techniques for automating the detection of anomalous performance in rotating machinery
[CONF-790435-2] N80-13481
Fractographic study of a thick wall pressure vessel failure
[CONF-790730-2] N80-13522
Application of static and dynamic crack arrest theory to thermal shock experiment TSE-4
[NUREG-CR-0767] N80-13524
Geopressure energy resource evaluation
[ORNL/PPA-79/2] N80-13605
Low-temperature thermal energy storage program annual operating plan
[ORNL/TM-6934] N80-13631
Mathematical modeling of phase change processes for latent heat thermal energy storage
[ORNL/CSD-39] N80-13639
Experimental and analytical OTEC studies at ORNL
[CONF-790631-1] N80-13666
Land-based application of an OTEC open-cycle power system
[CONF-790631-3] N80-13676
Industrial applications of advanced energy systems
[CONF-790602-54] N80-13708
Utility language for the NMFECC
[CONF-781053-4] N80-13827
Lecture notes on ordinary differential equations software, user's guide for ODE, RKF45, GEAR and EPISODE
[ORNL/CSD/TM-64] N80-13849
Recent advances in design for low and medium-energy heavy ion accelerators
[CONF-790327-7] N80-13912
Scaling studies of beam-heated tokamaks
[ORNL/TM-6584] N80-13939
NFREYA: A Monte Carlo beam deposition code for noncircular Tokamak plasmas
[ORNL/TM-6845] N80-13944
Properties of single crystal beta-aluminas
[CONF-790538-9] N80-13977
OAK RIDGE Y-12 PLANT, TENN.
Digital filtering techniques for use in minicomputers
[Y-2184] N80-13380
OCEAN DATA SYSTEMS, INC., MONTEREY, CALIF.
OTEC thermal response report for Pacific plant ship, 5 to 10 deg N 90 to 95 deg W
[HCP/T2898-01/3] N80-13656
OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, TOULOUSE [FRANCE].
A review of research into oscillating boundary layers
[AAAF-NT-79-04] N80-13423
First results of a study on turbulent boundary layers in an oscillating flow with a mean adverse pressure gradient
[AAAF-NT-79-05] N80-13424
OHIO STATE UNIV., COLUMBUS.
Recent applications of variational techniques in statistics
[AD-A073511] N80-13868
OHIO STATE UNIV. RESEARCH FOUNDATION, COLUMBUS.
Investigations on the hierarchy of reference frames in geodesy and geodynamics
[NASA-CR-162499] N80-13731
OHIO UNIV., ATHENS.
In-service improvements and modernization of all components of the instrument landing systems. Volume 1: Sections 1-10
[AD-A074425] N80-13018
In-service improvements and modernization of all components of the instrument landing systems. Volume 2: Sections 11 and 12
[AD-A074426] N80-13019
OKLAHOMA STATE UNIV., STILLWATER.
Temperature dependence of the viscosity of some crude oils and pure liquids
N80-13182
Heat-transfer in helically coiled tubes with laminar flow
N80-13393
MERADCOM/OSU hydraulic system reliability program
[AD-A073789] N80-13493
OKLAHOMA UNIV., NORMAN.
Count state analysis of a digital phase locked loop
N80-13352
Fault test generation for sequential circuits: A search directing heuristic
N80-13353
Jet transport performance in thunderstorm wind shear conditions
[NASA-CR-3207] N80-13742
OLD DOMINION UNIV., NORFOLK, VA.
Synthesis of a control model for a liquid nitrogen cooled, closed circuit, cryogenic nitrogen wind tunnel and its validation
[NASA-CR-162508] N80-13058
Curing and flow of thermosetting resins for composite material pultrusion
N80-13244
OPTISCHE WERKE G. RODENSTOCK, MUNICH [WEST GERMANY].
Mounting procedure for high quality optical systems
[BMFT-FB-T-78-19] N80-13929
OREGON STATE UNIV., CORVALLIS.
Critique of the meteorological and air quality baseline monitoring program for the prototype oil shale leaseholds. Part A: Comments on the approach taken and recommendations for continuing program. Part B: Comments on the data acquisition and management
[DOE/EV-70031/4-PT-A/B] N80-13723
Stochastic intergration using random point processes
N80-13860
A theoretical investigation of the electronic band structure and bulk properties of diamond
N80-13953
OREGON UNIV., EUGENE.
Precision determination of atomic level energies by absorption spectrometry with synchrotron radiation
N80-13888
Measurement of the inelastic x-ray scattering cross section of neon with synchroton radiation
N80-13889
Charge carrier mobility and transmission across the liquid-vapor interface for the dielectric liquid hydrogen
N80-13899
deHass-vanAlphen measurements of spin resolved scattering in the Cu[Mn] magnetic impurity system
N80-13955
OXFORD UNIV. [ENGLAND].
Plastic flow of mild steel under proportional and non-proportional straining at a controlled rate
[OUEL-1280/79] N80-13241
User's handbook for GT8 galvanometer drive amplifier system
[OUEL-1284/79] N80-13436

P

PACIFICA TECHNOLOGY, DEL MAR, CALIF.
Retrievable storage concept designs
[UCRL-15018] N80-13920
PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
An investigation of optimization techniques for drawing computer graphics displays
[NASA-CR-162509] N80-13814
PENNSYLVANIA UNIV., PHILADELPHIA.
Computational of physical and chemical equilibria
N80-13184
The rate of dissociation of CO2 on liquid iron and nickel
N80-13215
Real-time emulation of hardware
N80-13802
Distributed database organization for optimal computer network response time
N80-13828
Experimental investigation of the absolute tunneling current density in field emission from tungsten [110]
N80-13963

PHILLIPS PETROLEUM CO., HOMER CITY, PA.
Gas generator research and development: BI-GAS process
[FE-1207-62] N80-13286
PISA UNIV. [ITALY].
The influence of ceramic permanent magnets on the armature of a small potential dc motor
[REPT-1631] N80-13386
PITTSBURGH UNIV., PA.
Theoretical analysis of multi-cell, high efficiency broad spectral sensitivity solar cells
N80-13617
An empirical power study of recursive outlier detection procedures
N80-13854
PLANCO, INC., DALLAS, TEX.
Survey of the research into energy-economy interactions. Volume 1: Survey
[HCP/16346-01-1-VOL-1] N80-13633
POLYTECHNIC INST. OF BUCHAREST [RUMANIA].
Analysis techniques of experimental frequency response data
N80-13497
POLYTECHNIC INST. OF NEW YORK.
A study of ternary systems containing an acidic copolymer, a basic copolymer and a solvent
N80-13250
The self-organizing data base
N80-13788
Surface-wave scattering by dielectric gratings with arbitrary profiles
N80-13964
POLYTECHNIC INST. OF NEW YORK, BROOKLYN.
Summary of technical progress, investigation of software models
[AD-A073639] N80-13819
POLYTECHNICAL UNIV. OF MADRID [SPAIN].
Floating zone stability [exp. 1-ES-331]
N80-13078
PORTLAND STATE UNIV., OREG.
Current methods for analyzing dynamic cable response
N80-13500
POWER TECHNOLOGIES, INC., SCHENECTADY, N. Y.
Induction and synchronous machines for vertical axis wind turbines
[SAND-79-7017] N80-13675
PRAKLA-SEISMOS G.M.B.H., HANNOVER [WEST GERMANY].
Further development of the Radio-ANA-System
[BMFT-FB-M-78-05] N80-13021
PRATT AND WHITNEY AIRCRAFT GROUP, WEST PALM BEACH, FLA.
Development of mainshaft high-speed cylindrical roller bearings for gas turbine engines
[AD-A073381] N80-13475
PRINCETON UNIV., N. J.
An exploratory investigation of the STOL landing maneuver
[NASA-CR-3191] N80-12996
Convective ignition of nitrocellulose based propellants in unsteady flow fields
[AD-A073546] N80-13271
PURDUE UNIV., LAFAYETTE, IND.
The water splitting light reaction of chlorophyll a dihydrate. Visible light solar energy conversion after the primary reaction in plant photosynthesis
N80-13188
X-ray measurement of carbon-caused atomic displacements in Fe-Ni-C martensite
N80-13217
Conversion of biomass from agriculture into useful products
[COO-4298-1] N80-13278
Recent developments for the nonlinear distortion of non-dispersive acoustic waves. Part 1: Planar waves and the basic method
N80-13311
The effects of Joule heat on turbulent dispersion of temperature in high Reynolds number flow
N80-13396
Digital processing of LANDSAT MSS and topographic data to improve capabilities for computerized mapping of forest cover types
[E80-10009] N80-13588
The modeling of virtual memory systems
N80-13789
Image segmentation by statistical edge detection and sequential edge growing
N80-13831
Gamma-minimax and minimax decision rules for comparison of treatments with a control
[AD-A073576] N80-13834
Asymptotic theory for process least squares estimators for diffusion processes
[AD-A073577] N80-13864
Some contributions to gamma-minimax and empirical Bayes selection procedures
[AD-A073574] N80-13869
Difference frequency mixing in insulating GaAs and magnetooptical studies in Hg0.89Mno.11Te
N80-13952

R

RAYTHEON CO., WAYLAND, MASS.
PAVE PAWS modern programming data collection system
[AD-A073357] N80-13984
RCA LABS., PRINCETON, N. J.
Materials for solar thermal conversion
[COO-4557-1] N80-13670
RENSSELAER POLYTECHNIC INST., TROY, N. Y.
Delayed failure of vanadium-hydrogen alloys
[COO-3459-15] N80-13227
Fatigue and delayed failure of refractory metals
[COO-3459-14] N80-13233
RENSSELAER RESEARCH CORP., TROY, N. Y.
Convective heat transfer during dendritic growth
N80-13108
RESEARCH TRIANGLE INST., RESEARCH TRIANGLE PARK, N. C.
Novel concentrator photovoltaic converter system development
[SAND-79-7040] N80-13661
RICE UNIV., HOUSTON, TEX.
Evaporative cooling on a grooved surface
[NASA-CR-160410] N80-13401
A fundamental study of liquid spray evaporation at a heated surface
[NASA-CR-160409] N80-13405
Low-altitude signatures of the boundary layers
N80-13550
The Jovian boundary layer as formed by magnetic-anomaly effects
N80-13559
Earth and Jupiter: Comparison of magnetopause structure
N80-13560
Rates of mass, momentum, and energy transfer at the magnetopause
N80-13571
Internal magnetospheric plasma flow
N80-13574
ROCHESTER INST. OF TECH., N. Y.
Damping properties of turbine blades
N80-13303
ROCKETDYNE, CANOGA PARK, CALIF.
High-pressure LOX/CH4 injector program
[NASA-CR-161342] N80-13161
ROCKWELL INTERNATIONAL CORP., CANOGA PARK, CALIF.
Space construction system analysis, final review. Part 1: Executive summary
[NASA-CR-160286] N80-13063
Orbital Transfer Vehicle [OTV] engine study. Phase A: Extension
[NASA-CR-161338] N80-13160
ROCKWELL INTERNATIONAL CORP., EL SEGUNDO, CALIF.
Mechanical power system for aircraft intermittent utility functions
[AD-A073297] N80-13030
ROCKWELL INTERNATIONAL CORP., LOS ANGELES, CALIF.
Aerodynamic preliminary analysis system. Part 1: Theory
[NASA-CR-145284] N80-12998
ROCKWELL INTERNATIONAL SCIENCE CENTER, THOUSAND OAKS, CALIF.
Heterojunction materials and characteristics
[AD-A073792] N80-13365
ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
Positional error analysis, A-10 aircraft on three-axis ground mount
[AD-A073600] N80-13336
ROME AIR DEVELOPMENT CENTER, HANSCOM AFB, MASS.
Reliability and maintainability management manual
[AD-A073299] N80-13491
ROSENBLATT [M.] AND SON, INC., NEW YORK.
OTEC platform configuration and integration. Volume 1: Systems engineering and integration
[TID-29418] N80-13655
OTEC platform configuration and integration, executive summary
[DOE/ET-4065/1] N80-13711
OTEC platform configuration and integration. Volume 2: Technical concept
[DOE/ET-4065/1-VOL-2] N80-13712
OTEC platform configuration and integration, appendixes to volume 2
[DOE/ET-4065/1-VOL-2-APP] N80-13713
OTEC platform configuration and integation. Volume 3: Project plan
[DOE/ET-4065/1-VOL-3] N80-13714
ROSENTHAL-STEMAG, TECHNISCHE KERAMIK A.G., SELB [WEST GERMANY].
Development of high temperature resistant, incorrodible, non-metallic ceramic materials: The use of silicon nitride for heat exchangers in gas turbine applications
[BMFT-FB-T-78-51] N80-13266
ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH [ENGLAND].
A theoretical study of the supercritical aerofoil NLR 7301, and comparison with experiments
[RAE-TR-78119] N80-13010
The use of strip theory in the dynamics of deformable aircraft
[RAE-TM-STRUCT-933] N80-13035
Formulation of the equations of motion of a deformable aircraft using Lagrange's equations in an arbitrary non-inertial frame of reference
[RAE-TM-STRUCT-941] N80-13036
The equations of motion of an aircraft embracing its whole-body and deformational degrees of freedom
[RAE-TR-79010] N80-13037
A suggestion as to a general derivation of the equations of motion of a deformable aircraft for small perturbations which will be most generally acceptable
[RAE-TR-79011] N80-13038
Some measurements of buffeting on an aeroelastic model of a slender wing aircraft
[RAE-TM-STRUCT-942] N80-13055
The acoustic characteristics of the RAE 1.5m wind tunnel
[RAE-TR-79002] N80-13062
Table of space vehicles: 1973 - 1978
[RAE-TM-SPACE-271] N80-13126
Determination and geophysical intepretation of the orbit of China 2 rocket [1971-18B]
[RAE-TR-78107] N80-13137
The Miranda star sensor experiment
[RAE-TR-78112] N80-13146
Notes on the transient responses and errors of shock accelerometers with second-order filters
[RAE-TM-IT-179] N80-13435
The implementation and practical verification of a superposition method for the solution of elastic crack problems
[RAE-TM-STRUCT-940] N80-13527
The gravity field of the earth
[RAE-TR-78142] N80-13737
The scattering of sound by a region of fluid in solid body rotation at low Mach number
[RAE-TR-78100] N80-13886
The George 3 and 4 accounting system
[RAE-TR-78080] N80-13983
ROYAL INST. OF TECH., STOCKHOLM [SWEDEN].
Solidification of some eutectic alloys under microgravity conditions and at 1 g
N80-13097
The influence of microgravity on the structure of Bi-Zn immiscible alloys
N80-13098
A testing machine which fulfills fixed boundary displacement conditions
[TRITA-HFL-0022] N80-13528
An electric-current model of the magnetosphere
N80-13531
Quasistatic electric fields observed during a number of magnetopause crossings by ISEE-1
N80-13535
Comments on the low-altitude optical signatures of magnetospheric boundary layers
N80-13556
ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
Meteorological and oceanographic observations on board Dutch light vessels and the light platform 'Goeree' in the North Sea
[KNMI-141-26] N80-13749
Meteorological observations in the Netherlands for 1977
[KNMI-97-129] N80-13750

S

SANDIA LABS., ALBUQUERQUE, N. MEX.
Experimental study of heat transfer from a yawed cylinder to air with a constant wall heat flux
[SAND-79-8022] N80-13005
Aerodynamic design of an extended-range guided bomb
[LOG-C3719] N80-13023
Identification of the elastic constants for composites using modal analysis
[SAND-79-0527C] N80-13176
Development of laboratory apparatus dedicated to the study of hydride-dehydride reactions
[SAND-78-1803] N80-13201
Quantitative gas analysis using Fourier transform infrared spectroscopy
[SAND-79-0968] N80-13202
Carbon dioxide concentration and temperature in flames measured by Raman spectroscopy
[SAND-79-8612] N80-13204
Fatigue aging of adhesive bonds
[SAND-78-1842C] N80-13262
Shock-induced electrical switching in polymeric films
[CONF-790540-11] N80-13264
Coal liquefaction short residence time process research
[SAND-79-1400] N80-13272
Latch-up and radiation integrated circuit--LURIC: A test chip for CMOS latch-up investigation
[SAND-78-1540] N80-13369
Rom-based sequential circuits: An alternative approach to conventional logic design
[SAND-78-2333] N80-13370

IVFOR: A user oriented program characterizing the current-voltage properties of a two terminal device
[SAND-79-0972] N80-13373
Effects of metallurgical microstructure of armatures on compressed magnetic field generators
[SAND-79-0890C] N80-13375
Latch-up control in CMOS integrated circuits
[SAND-79-0646C] N80-13382
Heat conduction from a sphere to an infinite external region
[SAND-79-0366] N80-13419
Development of in situ marine seismic and geotechnical instrumentation systems
[SAND-79-0868C] N80-13431
Portable high-temperature, high-pressure viscometer development
[SAND-78-1409] N80-13433
Transmission of free-running laser pulses of high energy and power densities through previously gamma radiated fiber waveguides
[SAND-79-0441] N80-13462
Method for describing nearly normal penetration of an ogive nosed penetrator into terrestrial targets
[SAND-79-0721] N80-13479
Method for accelerated aging under combined environmental stress conditions
[SAND-79-0930C] N80-13494
Recent spin test of two composite wagon wheel flywheels
[SAND-79-1669C] N80-13640
Solar thermal test facility heliostat development
[SAND-78-1177] N80-13642
Performance testing of the General Electric Engineering Prototype Collector
[SAND-79-0514] N80-13645
Development of a lithium alloy/iron disulfide, 60-minute primary thermal battery
[SAND-79-0814] N80-13684
Sandia Laboratories operational experience with small heat engines in solar thermal power systems
[SAND-78-2163C] N80-13693
Hydride engines
[SAND-78-2303C] N80-13709
Weight minimization of sandwich type solar collector panels
[SAND-78-2305C] N80-13710
Carbon particulate measurements in a diesel engine
[SAND-79-8210] N80-13725
Average structure of the upper Earth mantle and crust between Albuquerque and the Nevada test site
[SAND-79-0975] N80-13732
TFILE: A user callable tape file archiving system for NOS
[SAND-78-2022] N80-13829
Controlling magnetic field profiles
[SAND-79-0678] N80-13876
Relativistic electron bean energy deposition in thin gold and aluminum targets
[SAND-78-2026] N80-13901
Evaluation of the proposed WIPP site in Southeast New Mexico
[SAND-79-1113C] N80-13909
Selected papers on piezoelectricity and impulsive 'pressure' measurements
[SAND-78-1911] N80-13974

SANDIA LABS., LIVERMORE, CALIF.
Chemistry and heat treatment effects on mechanical and microstructural properties of heat-treated, beta-extruded Ti-6Al-6V-2Sn
[BDX-613-2170-REV] N80-13224
Data acquisition system for the Hamilton Standard W2 electron beam welder
[SAND-79-8014] N80-13482

SANTA CLARA UNIV., CALIF.
The development of a drag sensing three dimensional turbulent ball probe
[NASA-CR-152269] N80-13427

SCIENCE APPLICATIONS, INC., ALBUQUERQUE, N. MEX.
Technical review of the Sandia Laboratories' Particle Beam Fusion Program
[SAND-79-7044] N80-13940

SCIENCE APPLICATIONS, INC., ENGLEWOOD, COLO.
An exploratory study of the cognitive structures underlying the comprehension of software design problems
[AD-A073727] N80-13821

SHEFFIELD UNIV. [ENGLAND].
A wave-particle-wave interaction observed on GEOS-2
N80-13543

SHOCK AND VIBRATION INFORMATION CENTER [DEFENSE], WASHINGTON, D. C.
The shock and vibration digest, volume 11, number 3
[AD-A066514/1] N80-13298
The shock and vibration digest, volume 11, number 4
[AD-A067426/7] N80-13302
The shock and vibration digest, volume 11, number 5
[AD-A069685/6] N80-13306
The shock and vibration digest, volume 11, number 7
[AD-A072745/3] N80-13310
The shock and vibration digest, volume 11, number 2
[AD-A065807] N80-13495
The shock and vibration digest, volume 11, number 6
[AD-A070464/3] N80-13499

SILICON TECHNOLOGY CORP., OAKLAND, N. J.
Development of methods of producing large areas of silicon sheet by the slicing of silicon ingots using inside diameter [I.D.] saws
[NASA-CR-162520] N80-13621

SOLAREX CORP., ROCKVILLE, MD.
Silicon concentrator solar cell manufacturing development
[SAND-79-7021] N80-13697

SOUTHAMPTON UNIV. [ENGLAND].
Towards a more quantitative understanding of dayside magnetopause currents
N80-13578

SOUTHERN METHODIST UNIV., DALLAS, TEX.
Investigation of blown boundary layers with an improved wall jet system
[NASA-CR-162512] N80-13004
Radiation fields of dielectric optical waveguides
N80-13325
Autoregressive acquisition and interference-test coding for spread spectrum communications
N80-13329
Two-dimensional sequential algorithms for image restoration and enhancement
N80-13354
Investigation of blown boundary layers with an improved wall jet stream
N80-13400

SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
Reflected blast measurements at small scaled distances for M26E1 propellant
[AD-A073409] N80-13269
Approximate techniques for plastic deformation of structures under impulsive loading, 2
N80-13313

SRI INTERNATIONAL CORP., ARLINGTON, VA.
Laser induced photochemistry
[SAN-115/136-1] N80-13203

SRI INTERNATIONAL CORP., MENLO PARK, CALIF.
Particle impact damage in silicon nitride, part 3
[AD-A073570] N80-13172
Lidar observations at 0.7-micrometers and 10.6-micrometers wavelengths during dusty infrared test I
[DIRT I]
[AD-A073330] N80-13340
Interactive aids for cartography and photo interpretation
[AD-A073452] N80-13603

STANDARD ELEKTRIK LORENZ A.G., STUTTGART [WEST GERMANY].
Feasibility study within the Spacelab utilization program: Common equipment, communication/navigation [COMNAV]
[BMFT-FB-W-78-36] N80-13130
Feasibility study for Spacelab user program: Propagation of electromagnetic waves
[BMFT-FB-W-78-10] N80-13344

STANFORD LINEAR ACCELERATOR CENTER, CALIF.
Elastic electron scattering at large momentum transfer
[SLAC-PUB-2334] N80-13903
Phenomenology of heavy leptons and heavy quarks
[SLAC-PUB-2226] N80-13904

STANFORD UNIV., CALIF.
Acoustic techniques for measuring stress regions in materials
[EPRI-NP-1043] N80-13525
Transients effects in M/G/1 queues; an empirical investigation
[AD-A073744] N80-13833
Maximum likelihood estimation of the autoregressive coefficients and moving average covariances of vector autoregressive moving average models
[AD-A073788] N80-13845
Maximum likelihood estimation of the parameters of a multivariate normal distribution
[AD-A073796] N80-13865
Anti-Stokes emission as a VUV and soft X-ray source
[NASA-CR-162266] N80-13923

STATE UNIV. OF NEW YORK, STONY BROOK.
Determining biological fine structure by differential absorption of soft X-ray
[BNL-26282] N80-13760

STATE UNIV. OF NEW YORK AT STONY BROOK.
Heterodyne detection and generation of microwave radiation by superconducting microbridges in a resonant structure
N80-13954
Planar Josephson junction radiation detector
N80-13958

STATE UNIV. OF NEW YORK COLL. OF ENVIRONMENTAL SCIENCE AND FORESTRY, SYRACUSE.
Formation of block polymers involving poly-[P-xylelene] blocks
N80-13251

STEVENS INST. OF TECH., HOBOKEN, N. J.
An investigation of the effects of analog and digital systems on signal fidelity
N80-13327
An investigation of the efficiency of regenerative blowers and pumps
N80-13463
An experimental and theoretical investigation of magnetic ordering in Yttrium Iron Garnet
N80-13946
Formation and coalescence of epitaxial crystallites in nickel electrodeposiiton in air and argon atmospheres
N80-13947

STUTTGART UNIV. [WEST GERMANY].
Some 3-5-semiconductor crystals grown by the traveling-heater method
N80-13117

SUSSEX UNIV., BRIGHTON [ENGLAND].
The boundary of a pulsar magnetosphere: Gamma-ray pulsars
N80-13566

SYRACUSE UNIV., N. Y.
Measurement of the electrical properties of composite materials in the frequency range of DC to 30 MHz
[AD-A073638] N80-13175
An adsorption study of hydrogen on iron and its relation to hydrogen embrittlement
N80-13209
A filamentary multipole model for cylindrical antennas
N80-13320
A study of a reactively loaded finite planar rectangular waveguide antenna array
N80-13324
Detection and MMSE estimation of nonlinear memoryless functionals of random processes using the Volterra functional expansion
N80-13355
Stochastic modelling for reliability and other performance measures of software systems with applications
N80-13486
Modelling of crack tip deformation with finite element method and its aplications
N80-13503
The analysis of processor-time trade-off opportunities in a reconfigurable multi-processor system
N80-13783
Statistical analysis of finite mixtures of exponential and Weibull distributions
N80-13857
Initial epitaxy and interdiffusion phenomena in Au-Cu bilayers
N80-13948
Epitaxy and misfit dislocations in large misfit systems
[CONF-790442-17] N80-13972

SYSTEM DEVELOPMENT CORP., EDWARDS, CALIF.
Extreme mean and its applications
[NASA-TM-81346] N80-13863

SYSTEMS CONTROL, INC., PALO ALTO, CALIF.
Establishment criteria for Distance Measurement Equipment [DME] with instrument landing system and/or localizer approach
[AD-A069818] N80-13016

SYSTEMS TECHNOLOGY CORP., XENIA, OHIO.
A technical and economic evaluation of the project in Baltimore, Maryland, volume 2
[PB-297871/6] N80-13991
A technical and economic evaluation of the project in Baltimore, Maryland, Volume 3
[PB-297872/4] N80-13992
A technical and economic evaluation of the project in Baltimore, Maryland, volume 4
[PB-297873/2] N80-13993

T

TECHNISCHE HOCHSCHULE, DARMSTADT [WEST GERMANY].
Influence of the interplanetary magnetic field on the position of the dayside magnetopause
N80-13570

TECHNISCHE HOGESCHOOL, DELFT [NETHERLANDS].
Unidirectional solidification of eutectic iron-carbon alloys and the segregation of sulfur
N80-13085

TECHNISCHE UNIV., BERLIN [WEST GERMANY].
Fundamental experiments on interfacial convection; Project TEXUS 1 and 2
N80-13102
Examination and selection of suitable methods for measuring the thermal conductivity of liquids in Spacelab
[BMFT-FB-W-78-09] N80-13207
Development of a mass transfer machine for gas/liquid operations in the absence of gravity
[BMFT-FB-W-78-20] N80-13420

TECHNISCHE UNIVERSITAET, CLAUSTHAL-ZELLERFELD [WEST GERMANY].
Reactions between glass melts
N80-13101

TECHNISCHE UNIVERSITAET, HANOVER [WEST GERMANY].
Contributions to Marangoni convection in cylindric melting zones: Experimental simulation and calculation of the influence of gravity
[BMFT-FB-W-78-39] N80-13421
TECHNISCHE UNIVERSITAET, MUNICH [WEST GERMANY].
Satellite contributions to tidal studies
[TUM-MITT-147] N80-13583
TELEDYNE BROWN ENGINEERING, HUNTSVILLE, ALA.
Office of Aeronautics and Space Technology preliminary requirements for space science and applications platform studies
[NASA-CR-161346] N80-13066
Guidelines for mission integration, a summary report
[NASA-CR-161347] N80-13067
TEMPLE UNIV., PHILADELPHIA, PA.
Invariant subspaces associated with decomposition N80-13874
TENNESSEE TECHNOLOGICAL UNIV., COOKEVILLE.
Analysis of combustion instability in liquid fuel rocket motors
[NASA-CR-159733] N80-13164
Stability analysis of a liquid fuel annular combustion chamber
[NASA-CR-159734] N80-13165
Amplification of Reynolds number dependent processes by wave distortion
[NASA-CR-159732] N80-13193
TENNESSEE UNIV., KNOXVILLE.
Preparation and characterization of polymers formed by irradiation of beta-pinene and other monomers N80-13249
The study of MHD instabilities in elongated tokamaks N80-13935
TEXACO, INC., MONTEBELLO, CALIF.
Gasification of residual materials from coal liquefaction
[FE-2247-22] N80-13289
TEXAS A&M UNIV., COLLEGE STATION.
Effects of soft foam insulation impact
[NASA-CR-160400] N80-13472
A preliminary research plan for development of a photosynthetic link in a closed ecological life support system
[NASA-CR-160399] N80-13758
A density-quantile function approach to choosing order statistics for the estimation of location and scale parameters
[AD-A073270] N80-13866
Discussion of paper by Good and Gaskins on density estimation and bump hunting
[AD-A073269] N80-13867
TEXAS TECHNOLOGICAL UNIV., LUBBOCK.
Phase measurements of fast wave toroidal eigenmodes N80-13931
TEXAS UNIV., AUSTIN.
Analysis of reentry vehicle trajectory reconstruction and parameter identification
[SAND-79-1365C] N80-13136
TEXAS UNIV., DALLAS.
Ionospheric convection at high latitudes N80-13551
TEXAS UNIV. AT ARLINGTON.
Determining load characteristics for transient performances. Volume 3: Procedure for modeling power system loads
[EPRI-EL-849-VOL-3] N80-13381
TEXAS UNIV. AT DALLAS, RICHARDSON.
Impulsive penetration and viscous interaction N80-13577
TEXAS UNIV. HEALTH SCIENCE CENTER, HOUSTON.
Energy and spectrum measurements of high energy electrons beams using a Cerenkov detector N80-13898
TRITEC, INC., COLUMBIA, MD.
Industrial capability to chem-mill aluminum alloy 2219 in T-37 and T-87
[NASA-CR-161349] N80-13316
TRW DEFENSE AND SPACE SYSTEMS GROUP, REDONDO BEACH, CALIF.
Solar power satellite system definition study. Volume 1, phase 1: Executive summary
[NASA-CR-160370] N80-13139
Solar power satellite system definition study. Volume 2, phase 1: Systems analyses tradeoffs.
[NASA-CR-160371] N80-13140
Solar power satellite system definition study. Volume 3: Reference system description, phase 1
[NASA-CR-160372] N80-13141
Solar power satellite system definition study. Volume 5, phase 1: Executive summary
[NASA-CR-160374] N80-13143
Solar power satellite system definition study. Volume 6, phase 1: Space construction and transportation
[NASA-CR-160375] N80-13144
Solar power satellite system definition study. Volume 7, phase 1: SPS and rectenna systems analyses
[NASA-CR-160376] N80-13145
Heat pipe cooled power magnetics
[NASA-CR-159659] N80-13362
PEP solar array definition study
[NASA-CR-160398] N80-13622
TRW SYSTEMS GROUP, MCLEAN, VA.
Methane recovery from coalbeds project. Technology test projects: Evaluation of candidate projects
[METC-8089-T4] N80-13290

U

UNION COLL., SCHENECTADY, N.Y.
Sequential analysis of variance: Monte Carlo simulation, multivariate normal approximation, and robustness
[AD-A072629] N80-13818
UNITED TECHNOLOGIES CORP., SOUTH WINDSOR, CONN.
Integral cell scale-up and performance verification
[EPRI-EM-1134] N80-13646
UNITED TECHNOLOGIES RESEARCH CENTER, EAST HARTFORD, CONN.
Concept for UF6-fueled self-critical DNPL reactor system N80-13453
UNIVERSITE DES SCIENCES ET TECHNIQUES DE LILLE [FRANCE].
Unsteady flow characteristics in the near wake of a two dimensional obstacle
[AAAF-NT-79-08] N80-13008
UNIVERSITIES SPACE RESEARCH ASSOCIATION, BOULDER, COLO.
Warm/cold cloud processes
[NASA-CR-161336] N80-13743
UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES.
Low cost solar cells based on amorphous silicon electrodeposited from organic solvents
[SAN-0113-T3] N80-13678
Software for nonlinear filtering
[AD-A073051] N80-13817
UTAH STATE UNIV., LOGAN.
Cell adhesion as influenced by substrate surface properties N80-13252
UTAH UNIV., SALT LAKE CITY.
An orbital localization method and an iterative procedure for calculating nuclear magnetic resonance coupling constants N80-13189
Fracture studies in ceramics with particular emphasis on beta'-alumina N80-13243
SURFED: An interactive editor for free-form surfaces
[AD-A073424] N80-13825
High resolution astronomical imaging through the turbulent atmosphere N80-13994
High resolution astronomical imaging through the turbulent atmosphere
[AD-A073434] N80-13996

V

VANDERBILT UNIV., NASHVILLE, TENN.
Multiplicity and stability of nonadiabatic hydrogen-oxygen-nitrogen flames N80-13185
VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Effects of wall waviness and nonlinear wave interactions on the stability of boundary-layer flows N80-12992
Three-dimensional viscous hypersonic flows over general bodies using shock-layer and parabolized Navier-Stokes equations N80-12993
Application of synthetic molecular sieve zeolites and silica gel toward the separation of sulfur dioxide from combustion gases N80-13180
Dynamic snap-through of shallow arches and spherical caps N80-13299
The performance estimation of an axial-flow compressor stage using theoretically derived blade element characteristics with experimental comparison N80-13466
Experimental and predicted performance for the combustion of a low heating value gas in a swirl burner N80-13467
An analytical investigation of three-dimensional vibration in gear-coupled rotor systems N80-13471
Optimal design of elastic structures for stability under multiple loads N80-13504
The ocean tide and waves beneath the Ross Ice Shelf, Antarctica N80-13751
Invariant tests for scale parameters under elliptical symmetry N80-13855
VIRGINIA UNIV., CHARLOTTESVILLE.
A study of the dissipative mechanism in the flow of superfluid helium-4 using charged vortex rings N80-13314
Design and testing of high performance brushes
[AD-A073593] N80-13367
Mathematical modeling of the breakup of laminar capillary jets N80-13399
Dynamic analysis of complex multi-level flexible rotor systems N80-13509
Oxygen electrodes for energy conversion, storage, and conservation: Investigation of simple and mixed oxides N80-13620
Experimental and theoretical evaluation of a novel concentrating solar energy collection system
[SAND-79-1053C] N80-13671
Modeling studies of the pressure-flow relationship of the central airways N80-13763
Laser-induced emission from uranium-hexa-fluoride N80-13893
Melting behavior of small tin crystallites N80-13950
Inelastic electron tunneling spectroscopy of ring compounds on alumina N80-13957

W

WASHINGTON UNIV., SEATTLE.
Particle boundary structures at the magnetopause and the plasma sheet N80-13547
The application of formal models to a fully adaptive general purpose digital data compression system N80-13785
A compiler design for multiple independent processor computers N80-13786
Processor and file allocation in distributed data base systems N80-13787
Bounded nondeterminism and the parallel parsing of context-free languages N80-13804
The design and evaluation of algorithms for parallel processing N80-13805
Laser driven breakdown-heating waves in magnetized hydrogen N80-13933
Multiple-pass carbon dioxide laser heating of a theta-pinch plasma N80-13936
Thermal faceting behavior of single crystal aluminum oxide N80-13960
WASHINGTON UNIV., ST. LOUIS, MO.
GaAs waveguide detector array for an IOC spectrum analyzer
[AD-A073552] N80-13924
WAYNE STATE UNIV., DETROIT, MICH.
Studies of ionization processes
[AD-A073823] N80-13195
Interconnection networks in multiple-processor systems N80-13784
WEST VIRGINIA UNIV., MORGANTOWN.
Fluidized bed flow equations
[METC/CR-78/10] N80-13414
WESTINGHOUSE ELECTRIC CORP., SHARON, PA.
Feasibility study of an active system for transformer noise abatement
[COO-4376-T1] N80-13378
WISCONSIN UNIV. - MADISON.
Optimal design of flexible chemical processes N80-13187
A correlation between morphology and fracture properties of epoxy resins N80-13248
Estimation of the spectral moments and quadrature cross-correlation functions and their application to troposcatter systems N80-13322
Stimulated Thomson scattering N80-13330
Experimental evaluation of new solid state laser schemes
[AD-A073656] N80-13459
Internal combustion engine sampling probes: A study of sample-gas origins, flow disturbances and quench-layer bias N80-13468
Superlinearly globally convergent algorithms for nonlinear programming via sequential linear programs N80-13808
Estimation of smoothing parameters to smooth noisy data and confidence regions for the underlying function N80-13856
Newton's method for generalized equations and the PIES energy model N80-13872

Design and analysis of transient high voltage electrical devices: Ozone production in fast pulsed dielectric barrier discharges in oxygen and modeling of an intense relativistic electron beam source
N80-13890

Determination of the intensity of scattered radiation and the performance of grids in diagnostic radiology by Monte Carlo methods
N80-13921

WISCONSIN UNIV., MADISON.
Solidification of highly undercooled liquid metals and alloys
N80-13118

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
A compilation of moored current meter and wind recorder data. Volume 18: JASIN 1978, Moorings 651-653
[AD-A073581] N80-13755

WORLD METEOROLOGICAL ORGANIZATION, GENEVA [SWITZERLAND].
Space Observations for water resources: A potential to be developed
N80-13609

Report of the fifth planning meeting for the Monsoon Experiment [MONEX]. Part 1: Winter MONEX
[GARP-SPEC-REPT-30] N80-13748

WRIGHT STATE UNIV., DAYTON, OHIO.
PDP-11 computer monitoring system
[AD-A072966] N80-13790

Y

YALE UNIV., NEW HAVEN, CONN.
Parameter estimation narrow-band processes with arrays
N80-13332

Resonant Raman scattering from electron-phonon coupled modes in 3-V semiconductors
N80-13356

The transfer of information and authority in a protection system
[AD-A073370] N80-13791

The complexity of the maximum subgraph problem
N80-13809

Detection of multivariate outliers
N80-13861

Algorithms for network flow problems with convex separable costs
N80-13871

Studies in structure and magnetic short range order. 1: Structure in amorphous germanium. 2: Magnetic interactions in gadolinum gallium garnet
N80-13956

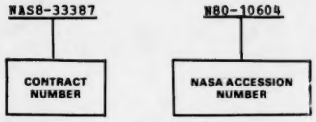
Polarization parameter measurement for K+p elastic scattering below 1 Ge/V/c
N80-13959

Dual photoconductivity effects induced by the intersubband transitions in n-type silicon inversion layers
N80-13962

Z

ZURICH UNIV. [SWITZERLAND].
Snow mapping from space platforms
N80-13611

Typical Contract Number Index Listing



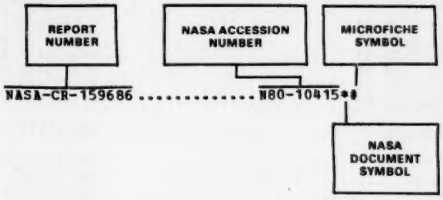
Listings in this index are arranged alphanumerically by contract number. Under each contract number the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

AF PROJ. 1209
N80-13366
AF PROJ. 2003
N80-13790
AF PROJ. 2054
N80-13219
AF PROJ. 2114
N80-13336
AF PROJ. 2128
N80-13822
AF PROJ. 2180
N80-13364
AF PROJ. 2301
N80-13220
AF PROJ. 2303
N80-13195
AF PROJ. 2304
N80-13492
N80-13817
N80-13819
AF PROJ. 2305
N80-13817
AF PROJ. 2338
N80-13175
N80-13363
N80-13491
AF PROJ. 2401
N80-13174
AF PROJ. 2531
N80-13826
AF PROJ. 3145
N80-13030
AF PROJ. 4600
N80-13339
AF PROJ. 5581
N80-13792
AF PROJ. 9991
N80-13844
AF-AFOSR-2717-74
N80-13966
AF-AFOSR-2770-75
N80-13195
AF-AFOSR-3050-76
N80-13492
AF-AFOSR-3100-76
N80-13817
AF-AFOSR-3212-77
N80-13996
AF-AFOSR-3580-78
N80-13220
ARPA ORDER 2180
N80-13364
ARPA ORDER 2894
N80-13603
ARPA ORDER 3045
N80-13338
ARPA ORDER 3231
N80-13455
ARPA ORDER 3517
N80-13223
ARPA ORDER 3579
N80-13456
BMFT-NT-0552 N80-13980
BMFT-NT-1011 N80-13929
BMFT-NTS-0007
N80-13266
BMFT-RV-14-B30/73
N80-13545
BMFT-SLN-7761
N80-13420
N80-13421
BMFT-WE-0175 N80-13608
BMFT-WRK-0274
N80-13132
BMFT-WRS-10/7
N80-14010
N80-14011
N80-14013
N80-14014
BMFT-WRT-181 N80-13736
BMFT-WRT-1075
N80-13127
N80-13207
N80-13774
BMFT-WRT-1076
N80-13128
N80-13129
N80-13131
N80-13344
N80-13768
BMFT-WRT-1077
N80-13130
N80-13147
CNES-212 N80-13547
CNR/SAS-77-061
N80-13114
CNR/SAS-77-0061
N80-13105
DA PROJ. 1L1-61102-AH-43
N80-13965
DA PROJ. 1L1-62209-AH-76
N80-13029
DA PROJ. 1L2-62209-AH-76
N80-13032
DAAA21-76-C-0219
N80-13269
DAAG29-76-C-0057
N80-13603
DAAG29-76-G-0222
N80-13458
DAAG29-77-C-0001
N80-13340
DAAG29-77-C-0035
N80-13847
N80-13848
DAAG29-78-C-0046
N80-13270
DAAG29-78-G-0153
N80-13271
DAAG29-78-G-0157
N80-13118
DAAG29-78-G-0180
N80-13866
N80-13867
DAAG39-77-C-0056
N80-13368
DAAJ02-77-C-0054
N80-13032
DAAK10-79-M-2239
N80-13270
DAAK51-78-C-0012
N80-13029
DAAK70-77-C-0097
N80-13493
DAAK70-77-C-0179
N80-13773
DAAK70-77-C-0222
N80-13625
DAHC19-78-C-0005
N80-13821
DE-AC03-76SF-00515
N80-13903
DE-AC04-76DP-00613
N80-13967
DE-AC04-76DP-00789
N80-13176
N80-13264
N80-13494
N80-13693
N80-13698
DE-AC07-76ID-01540
N80-13919
DE-AC21-76MC-05201
N80-13735
DE-AI01-79ET-20485
N80-13317
DE-AI03-79SF-10505
N80-13663
DE-AT03-76ET-35300
N80-13178
N80-13415
N80-13521
DEN3-32 N80-13989
DFVLR-BPT-QV-437
N80-13130
DFVLR-BPT-01-DO-084
N80-13132
DFVLR-BPT-01-OO-016
N80-13774
DFVLR-BPT-01-OO-048
N80-13147
DFVLR-BPT-01-OO-096
N80-13768
DFVLR-BPT-01-QV-236
N80-13420
DFVLR-BPT-01-QV-276
N80-13083
DFVLR-BPT-01-QV-447
N80-13083
DFVLR-BPT-01-QV-576
N80-13421
DFVLR-BPT-01-YK-017
N80-13131
DFVLR-01-OO-057A
N80-13128
DFVLR-01-QV-106
N80-13127
DFVLR-01-QV-176
N80-13207
DFVLR-01-QV-376
N80-13344
DFVLR-01-YA-017
N80-13129
DI-BM-H0155092
N80-13601
DOE-IA-40-551-75
N80-13413
DOE-IA-40-552-75
N80-13413
DOT-CG-81-76-1476
N80-13754
DOT-CG-72074-A
N80-13764
DOT-FA75WA-3549
N80-13018
N80-13019
DOT-FA77WAI-261
N80-13017
DOT-FA77WAI-731
N80-13016
E(49-18)-1800
N80-13287
N80-13291
E(49-26)-1041
N80-13745
E(49-26)-1059
N80-13623
EC-77-A-31-1044
N80-13361
EC-77-A-31-1062
N80-13624
EC-77-A-31-10040
N80-13989
EE-77-C-02-4376
N80-13378
EF-77-A-01-2593
N80-13721
EF-77-C-01-2606
N80-13476
N80-13484
EG-76-C-01-4065
N80-13711
N80-13713
EG-77-C-01-4016
N80-13747
EG-77-C-01-4042
N80-13635
N80-13649
N80-13669
N80-13674
N80-13699
EG-77-C-01-4065
N80-13655
N80-13712
EG-77-C-02-4557
N80-13670
EG-77-C-03-1605
N80-13700
EG-77-S-02-4298
N80-13278
EG-77-S-02-4381
N80-13235
EG-77-S-02-4433
N80-13200
EG-77-S-02-4496
N80-13972
EG-77-S-02-4546
N80-13672
EG-77-S-02-4577
N80-13665
EI-78-C-01-6346
N80-13633
EM-77-S-01-5109
N80-13371
EM-78-C-02-4507
N80-13282
EPA-68-01-4359
N80-13991
N80-13992
N80-13993
EPRI PROJ. 271
N80-13483
EPRI PROJ. 609-1
N80-13525
ER-78-S-05-5773
N80-13197
ET-78-C-01-2898
N80-13656
ET-78-C-01-3407
N80-13657
ET-78-C-03-1740
N80-13660
ET-78-C-04-4267
N80-13688
ET-78-S-02-4649
N80-13707
ET-78-S-02-4878
N80-13694
EW-78-C-21-8089
N80-13290
EX-76-A-01-2295
N80-13687
EX-76-A-29-1041
N80-13745
EX-76-C-01-1207
N80-13288
EX-76-C-01-1800
N80-13287
N80-13291
EX-76-C-01-2098
N80-13283
EX-76-C-01-2247
N80-13289

EX-76-C-01-2286 N80-13281
EX-76-C-01-2307 N80-13280
EX-76-C-01-2495 N80-13724
EX-76-C-04-0789 N80-13369
EX-76-C-02-0016 N80-13225, N80-13238, N80-13277, N80-13294, N80-13383, N80-13417, N80-13418, N80-13632, N80-13650, N80-13651, N80-13654, N80-13760, N80-13914, N80-13915, N80-13916, N80-13971, N80-13979
EY-76-C-02-1198 N80-13975
EY-76-C-02-3077 N80-13477
EY-76-C-02-4094 N80-13377, N80-13692
EY-76-C-03-0115 N80-13203
EY-76-C-03-0167 N80-13415, N80-13521
EY-76-C-03-0575 N80-13904
EY-76-C-03-1011 N80-13734
EY-76-C-04-0053 N80-13284
EY-76-C-04-0613 N80-13224, N80-13260, N80-13384, N80-13967
EY-76-C-04-0656 N80-13138
EY-76-C-04-0789 N80-13005, N80-13136, N80-13201, N80-13202, N80-13204, N80-13262, N80-13264, N80-13272, N80-13342, N80-13370, N80-13373, N80-13375, N80-13382, N80-13419, N80-13431, N80-13433, N80-13462, N80-13479, N80-13482, N80-13640, N80-13642, N80-13644, N80-13645, N80-13661, N80-13671, N80-13675, N80-13693, N80-13697, N80-13704, N80-13709, N80-13710, N80-13725, N80-13732, N80-13829, N80-13876, N80-13901, N80-13909, N80-13940, N80-13974
EY-76-C-04-1570 N80-13409
EY-76-C-04-3533 N80-13626
EY-76-C-06-1830 N80-13883
EY-76-C-07-1540 N80-13919
EY-76-C-07-1570 N80-13408, N80-13416, N80-13434, N80-13478, N80-13627, N80-13910
EY-76-C-08-1183 N80-13606
EY-76-C-09-0001 N80-13733, N80-13905, N80-13917
EY-76-C-14-2170 N80-13198
EY-76-S-02-1599 N80-13604
EY-76-S-02-2733 N80-13230, N80-13231, N80-13516, N80-13519
EY-76-S-02-2858 N80-13668
EY-76-S-02-3084 N80-13229, N80-13517
EY-76-S-02-3459 N80-13227, N80-13233
EY-76-S-02-4072 N80-13234
EY-76-S-02-4122 N80-13518
EY-76-S-03-0034 N80-13643
EY-76-S-03-0113 N80-13678
EY-76-S-05-5126 N80-13851
EY-76-S-06-2227 N80-13723
EY-77-A-09-1007 N80-13746
EY-77-C-21-8087 N80-13414
FAA PROJ. 052-241-04 N80-13017
FAA-081-431-100 N80-13253
F04701-78-C-0079 N80-13406, N80-13540
F19628-76-C-0249 N80-13364
F19628-78-C-0002 N80-13017, N80-13822
F19628-78-C-0069 N80-13339
F29601-77-C-0040 N80-13366
F30602-75-C-0121 N80-13175
F30602-76-C-0371 N80-13363
F30602-77-C-0141 N80-13984
F30602-77-C-0205 N80-13792
F30602-78-C-0057 N80-13819
F30602-78-C-0079 N80-13826
F30602-78-C-0083 N80-13175
F33615-75-C-2011 N80-13030
F33615-76-C-1258 N80-13790
F33615-77-C-3022 N80-13174
F33615-77-C-3160 N80-13051
F44620-76-C-0085 N80-13817
MDA903-77-C-0331 N80-13820
MIPR-FY-1455-76-00623 N80-13475
NASW-3176 N80-13982
NASW-3201 N80-14002
NAS1-14317 N80-13028
NAS1-14623 N80-13986
NAS1-14686 N80-12998
NAS1-15486 N80-13053
NAS2-7350 N80-12996
NAS2-9491 N80-13561
NAS2-9563 N80-13170
NAS3-20082 N80-13474
NAS3-20093 N80-13218
NAS3-20614 N80-13882
NAS3-20820 N80-13048
NAS3-21040 N80-13158
NAS3-21238 N80-13043, N80-13044, N80-13045
NAS3-21374 N80-13257
NAS4-2334 N80-13863
NAS5-11066 N80-13544
NAS5-11279 N80-14009
NAS5-11407 N80-13551
NAS5-20064 N80-13534, N80-13575
NAS5-20079 N80-13547
NAS6-2497 N80-13753
NAS7-100 N80-13558
NAS8-31377 N80-13742
NAS8-32472 N80-13068
NAS8-32607 N80-13359
NAS8-32711 N80-13066, N80-13067
NAS8-32996 N80-13160
NAS8-33131 N80-13743
NAS8-33205 N80-13162
NAS8-33206 N80-13161
NAS8-33510 N80-13316
NAS9-14523 N80-13770, N80-13771
NAS9-14589 N80-13064, N80-13065
NAS9-15051 N80-13922
NAS9-15274 N80-13405
NAS9-15409 N80-13334
NAS9-15487 N80-13759
NAS9-15508 N80-13588
NAS9-15582 N80-14003
NAS9-15636 N80-13139, N80-13140, N80-13141, N80-13142, N80-13143, N80-13144, N80-13145
NAS9-15718 N80-13063
NAS9-15800 N80-13149, N80-13151, N80-13589, N80-13590, N80-13591, N80-13592, N80-13593, N80-13594, N80-13595, N80-13596, N80-13815, N80-13816
NAS9-15815 N80-13360
NAS9-15846 N80-13757
NAS9-15870 N80-13622
NAS9-15873 N80-13758
NAS9-15962 N80-13472
NAS9-65274 N80-13401
NGL-05-020-103 N80-13923
NGL-16-001-043 N80-14009
NGR-05-002-160 N80-13544
NGR-05-017-033 N80-13427
NGR-14-006-137 N80-13560
NGR-43-003-015 N80-13164, N80-13165, N80-13193
NGR-44-004-120 N80-13551
NGR-44-006-012 N80-13550
NGR-44-006-137 N80-13559, N80-13571
NR PROJ. 042-034 N80-13845, N80-13865
NR PROJ. 083-005 N80-13755
NR PROJ. 083-400 N80-13755
NRL PROJ. R04-16 N80-13166
NSF AST-77-23069 N80-13565
NSF AST-78-21070 N80-13565
NSF ATM-74-08223 N80-13581
NSF ATM-74-23464 N80-13575
NSF ATM-75-02621 N80-13546
NSF ATM-77-12619 N80-13550, N80-13571
NSF ATM-78-03600 N80-13540
NSF ATM-78-21767 N80-13560
NSF C-659 N80-13555
NSF DMR-75-09477 N80-13077
NSF DMR-78-2207 N80-13265
NSF DMR-78-22462 N80-13077
NSF ENG-75-14847 N80-13833
NSF MCS-74-13017 N80-13825
NSF MCS-76-08316 N80-13864
NSF MCS-78-07736 N80-13865
NSF OCE-77-25803 N80-13755
NSG-1058 N80-13449
NSG-1328 N80-13814
NSG-1503 N80-13058
NSG-1548 N80-13004
NSG-3210 N80-13488, N80-13489, N80-13878
NSG-5085 N80-13577
NSG-5265 N80-13731
NSG-5286 N80-13550
NSG-7292 N80-13581
N00014-75-C-0152 N80-13755
N00014-75-C-0442 N80-13845, N80-13865
N00014-75-C-0455 N80-13834, N80-13864, N80-13869
N00014-75-C-0632 N80-13923
N00014-75-C-0752 N80-13791
N00014-75-C-0780 N80-13557
N00014-75-C-1175 N80-13923

N00014-75-C-1183
N80-13338
N00014-76-C-0050
N80-13968
N80-13969
N00014-76-C-0171
N80-13221
N80-13222
N00014-76-C-0197
N80-13755
N00014-76-C-0302
N80-13842
N80-13843
N00014-76-C-0402
N80-13459
N00014-76-C-0418
N80-13833
N00014-76-C-0657
N80-13172
N00014-76-C-0659
N80-13259
N00014-76-C-1009
N80-13367
N00014-77-C-0056
N80-13337
N00014-77-C-0157
N80-13825
N00014-77-C-0438
N80-13818
N00014-77-C-0646
N80-13925
N00014-78-C-0275
N80-13223
N00014-78-C-0312
N80-13824
N00014-78-C-0330
N80-13365
N00014-78-C-0543
N80-13868
N00014-78-C-0617
N80-13335
N00019-78-C-0031
N80-13173
N00140-76-C-0383
N80-13475
N00173-76-C-0303
N80-13455
N00173-78-C-0134
N80-13924
N62269-76-C-0214
N80-13772
PROJ. TELLUS N80-13598
N80-13599
PROJ. 6400 N80-13521
RA-23-216.00.0
N80-13667
RESEARCH PROJ. 408-1
N80-13292
SRI PROJ. PYU-4928
N80-13172
W-31-103-ENG-38
N80-13237
W-31-109-ENG-38
N80-13199
N80-13205
N80-13261
N80-13629
N80-13630
N80-13636
N80-13641
N80-13682
N80-13683
N80-13685
N80-13689
N80-13695
N80-13696
N80-13706
N80-13884
N80-13937
N80-13941
N80-13970
W-7405-ENG-26
N80-13226
N80-13232
N80-13240
N80-13265
N80-13295
N80-13380
N80-13407
N80-13412
N80-13413
N80-13432
N80-13481
N80-13522
N80-13524
N80-13605
N80-13631
N80-13639
N80-13664
N80-13666
N80-13676
N80-13686
N80-13708
N80-13827
N80-13849
N80-13912
N80-13939
N80-13944
N80-13977
N80-13978
W-7405-ENG-36
N80-13167
N80-13296
N80-13297
N80-13460
N80-13515
N80-13634
N80-13653
N80-13673
N80-13677
N80-13690
N80-13850
N80-13875
N80-13896
N80-13906
N80-13911
N80-13913
N80-13927
N80-13928
N80-13973
W-7405-ENG-48
N80-13177
N80-13206
N80-13228
N80-13236
N80-13239
N80-13263
N80-13341
N80-13372
N80-13374
N80-13376
N80-13379
N80-13385
N80-13410
N80-13411
N80-13461
N80-13477
N80-13480
N80-13523
N80-13638
N80-13647
N80-13648
N80-13652
N80-13680
N80-13722
N80-13767
N80-13793
N80-13852
N80-13894
N80-13895
N80-13897
N80-13907
N80-13908
N80-13918
N80-13920
N80-13938
N80-13942
N80-13943
N80-13976
N80-13985
N80-13990
N80-13997
N80-14001
N80-14015
N80-14016
W-7405-ENG-82
N80-13514
N80-13679
N80-13702
WF41421203 N80-13033
WF52551792 N80-13744
WI-78-3434-1 N80-13016
ZB0140811 N80-13846
505-05-52 N80-13043
N80-13044
N80-13045
505-09-13-11 N80-13769
505-10-51 N80-12991
505-31-63-06 N80-13430
505-32-11 N80-13003
505-33-43-02 N80-13429
505-33-53-03 N80-13879
505-33-73-03 N80-13402
505-34-33-06 N80-12995
505-35-13-01 N80-13880
505-35-33-01 N80-13024
505-43-13-01 N80-13002
505-43-23-02 N80-13001
505-43-23-04 N80-12994
505-44-33-01 N80-13013
506-25-33-05 N80-13438
506-51-33-02 N80-13052
506-53-53-01 N80-13512
506-54-23-01 N80-13135
506-61-53-04 N80-13730
513-52-13-62 N80-13020
533-03-14 N80-13027
638-10-00-01 N80-13152
664-04-00 N80-13333

Typical Report/Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A-7946 ..... N80-13255*#
A-8008 ..... N80-13041*#
A-8011 ..... N80-13333*#
A-8013 ..... N80-13003*#

AAAF-NT-79-02 ..... N80-13056 #
AAAF-NT-79-04 ..... N80-13423 #
AAAF-NT-79-05 ..... N80-13424 #
AAAF-NT-79-08 ..... N80-13008 #
AAAF-NT-79-11 ..... N80-13009 #

AD-A060841 ..... N80-13454 #
AD-A065807 ..... N80-13495
AD-A066514/1 ..... N80-13298
AD-A067426/7 ..... N80-13302
AD-A068684 ..... N80-13765 #
AD-A068927 ..... N80-13772 #
AD-A069088 ..... N80-13602 #
AD-A069093 ..... N80-13764 #
AD-A069130 ..... N80-13766 #
AD-A069685/6 ..... N80-13306
AD-A069818 ..... N80-13016 #
AD-A070076 ..... N80-13057 #
AD-A070337 ..... N80-13923*#
AD-A070464/3 ..... N80-13499
AD-A070939 ..... N80-13339 #
AD-A071157 ..... N80-13625 #
AD-A071249 ..... N80-13744 #
AD-A071458 ..... N80-13965 #
AD-A072629 ..... N80-13818 #
AD-A072743 ..... N80-13049 #
AD-A072745/3 ..... N80-13310
AD-A072909 ..... N80-13455 #
AD-A072966 ..... N80-13790 #
AD-A073009 ..... N80-13966 #
AD-A073051 ..... N80-13817 #
AD-A073269 ..... N80-13867 #
AD-A073270 ..... N80-13866 #
AD-A073280 ..... N80-13221 #
AD-A073296 ..... N80-13773 #
AD-A073297 ..... N80-13030 #
AD-A073299 ..... N80-13491 #
AD-A073300 ..... N80-13364 #
AD-A073316 ..... N80-13270 #
AD-A073330 ..... N80-13340 #
AD-A073340 ..... N80-13406 #
AD-A073346 ..... N80-13166 #
AD-A073347 ..... N80-13456 #
AD-A073357 ..... N80-13984 #
AD-A073361 ..... N80-13926 #
AD-A073370 ..... N80-13791 #
AD-A073377 ..... N80-13337 #
AD-A073378 ..... N80-13051 #
AD-A073381 ..... N80-13475 #
AD-A073384 ..... N80-13335 #
AD-A073409 ..... N80-13269 #
AD-A073410 ..... N80-13168 #
AD-A073412 ..... N80-13194 #
AD-A073424 ..... N80-13825 #
AD-A073431 ..... N80-13219 #
AD-A073433 ..... N80-13222 #
AD-A073434 ..... N80-13996 #
AD-A073436 ..... N80-13050 #
AD-A073442 ..... N80-13034 #
AD-A073443 ..... N80-13223 #
AD-A073444 ..... N80-13031 #
AD-A073449 ..... N80-13824 #
AD-A073452 ..... N80-13603 #
AD-A073454 ..... N80-13826 #
AD-A073455 ..... N80-13363 #
AD-A073464 ..... N80-13846 #
AD-A073481 ..... N80-13847 #
AD-A073486 ..... N80-13196 #
AD-A073487 ..... N80-13338 #
AD-A073497 ..... N80-13220 #
AD-A073507 ..... N80-13174 #
AD-A073511 ..... N80-13868 #
AD-A073546 ..... N80-13271 #
AD-A073552 ..... N80-13924 #
AD-A073553 ..... N80-13032 #
AD-A073554 ..... N80-13029 #
AD-A073563 ..... N80-13848 #
AD-A073564 ..... N80-13259 #
AD-A073565 ..... N80-13368 #
AD-A073570 ..... N80-13172 #
AD-A073574 ..... N80-13869 #
AD-A073575 ..... N80-13457 #
AD-A073576 ..... N80-13834 #
AD-A073577 ..... N80-13864 #
AD-A073581 ..... N80-13755 #
AD-A073587 ..... N80-13033 #
AD-A073588 ..... N80-13054 #
AD-A073590 ..... N80-13173 #
AD-A073593 ..... N80-13367 #
AD-A073600 ..... N80-13336 #
AD-A073602 ..... N80-13756 #
AD-A073622 ..... N80-13842 #
AD-A073624 ..... N80-13843 #
AD-A073638 ..... N80-13175 #
AD-A073639 ..... N80-13819 #
AD-A073656 ..... N80-13459 #
AD-A073661 ..... N80-13820 #
AD-A073671 ..... N80-13969 #
AD-A073672 ..... N80-13968 #
AD-A073727 ..... N80-13821 #
AD-A073744 ..... N80-13833 #
AD-A073748 ..... N80-13792 #
AD-A073756 ..... N80-13822 #
AD-A073757 ..... N80-13925 #
AD-A073760 ..... N80-13823 #
AD-A073767 ..... N80-13366 #
AD-A073768 ..... N80-13844 #
AD-A073788 ..... N80-13845 #
AD-A073789 ..... N80-13493 #
AD-A073792 ..... N80-13365 #
AD-A073796 ..... N80-13865 #
AD-A073814 ..... N80-13492 #
AD-A073815 ..... N80-13458 #
AD-A073822 ..... N80-13754 #
AD-A073823 ..... N80-13195 #
AD-A074338 ..... N80-13042 #
AD-A074424 ..... N80-13017 #
AD-A074425 ..... N80-13018 #
AD-A074426 ..... N80-13019 #
AD-A074490 ..... N80-13253 #
AD-A074881 ..... N80-13014 #

AD-E000312 ..... N80-13456 #
AD-E000314 ..... N80-13166 #
AD-E000320 ..... N80-13823 #
AD-E200353 ..... N80-13844 #
AD-E400329 ..... N80-13269 #
AD-E430261 ..... N80-13965 #
AD-E430285 ..... N80-13031 #

AECL-6301 ..... N80-13902 #

AEDC-TR-78-73 ..... N80-13049 #

AEDC-TSR-78-P9 ..... N80-13034 #

AES-7907 ..... N80-13818 #

AFAL-TR-78-192 ..... N80-13790 #

AFAPL-TR-79-2028 ..... N80-13030 #
AFAPL-TR-79-2063 ..... N80-13050 #

AFESC/ESL-TR-79-17 ..... N80-13219 #

AFFDL-TR-79-3011 ..... N80-13054 #
AFFDL-TR-79-3041 ..... N80-13174 #
AFFDL-TR-79-3048 ..... N80-13051 #

AFOSR-79-0923TR ..... N80-13817 #
AFOSR-79-0928TR ..... N80-13966 #
AFOSR-79-0942TR ..... N80-13195 #
AFOSR-79-0975TR ..... N80-13492 #

AFWL-TR-78-82 ..... N80-13366 #
AFWL-TR-78-119 ..... N80-13844 #

ALW-11 ..... N80-13601*#

AMRC-R-120 ..... N80-13366 #

AMS-1231-T ..... N80-12996*#

AMTE(N)-R-78111 ..... N80-13006 #
AMTE(N)-TM-78413 ..... N80-13885 #
AMTE(N)-TM-79401 ..... N80-13526 #

ANL-PMS-79-2-VOL-7 ..... N80-13629 #
ANL-PMS-79-2-VOL-8 ..... N80-13630 #

ANL-78-63 ..... N80-13237 #
ANL-78-108 ..... N80-13205 #
ANL-79-1 ..... N80-13685 #

ANL/ES-76 ..... N80-13636 #
ANL/FPP-78-4 ..... N80-13941 #
ANL/MHD-79-4 ..... N80-13937 #

AR-3 ..... N80-13292 #
AR-001-357 ..... N80-13194 #

ARBRL-INR-605 ..... N80-13031 #

ARBRL-TR-02164 ..... N80-13965 #
ARBRL-TR-02172 ..... N80-13031 #

ARI-TR-392 ..... N80-13821 #

ARLCD-CR-79010 ..... N80-13269 #

ARO-1478.7-M ..... N80-13848 #
ARO-13440.7-P ..... N80-13458 #
ARO-13833.4-GS ..... N80-13340 #
ARO-14778.6-M ..... N80-13847 #
ARO-15994.1-E ..... N80-13271 #
ARO-16228.10-M ..... N80-13866 #
ARO-16228.11-M ..... N80-13867 #
ARC-16359.1-P ..... N80-13270 #

ARWE-0-25/79 ..... N80-13853 #

ASR79-116 ..... N80-13160*#

ATC-87-VOL-3 ..... N80-13017 #

ATR-79(7748)-2 ..... N80-13664 #

AVSD-0344-78-CR ..... N80-13282 #

BDX-613-1198-REV ..... N80-13967 #
BDX-613-2157 ..... N80-13260 #
BDX-613-2170-REV ..... N80-13224 #
BDX-613-2229-REV ..... N80-13384 #

BMFT-FB-M-77-11 ..... N80-13726 #
BMFT-FB-M-78-05 ..... N80-13021 #

BMFT-FB-T-78-19 ..... N80-13929 #
BMFT-FB-T-78-51 ..... N80-13266 #
BMFT-FB-T-78-52 ..... N80-13980 #

BMFT-FB-W-78-01 ..... N80-13736 #
BMFT-FB-W-78-02 ..... N80-13774 #
BMFT-FB-W-78-05 ..... N80-13768 #
BMFT-FB-W-78-06 ..... N80-13127 #
BMFT-FB-W-78-07 ..... N80-13060 #
BMFT-FB-W-78-09 ..... N80-13207 #
BMFT-FB-W-78-10 ..... N80-13344 #
BMFT-FB-W-78-20 ..... N80-13420 #
BMFT-FB-W-78-24 ..... N80-13128 #
BMFT-FB-W-78-25 ..... N80-13129 #
BMFT-FB-W-78-31 ..... N80-13608 #
BMFT-FB-W-78-36 ..... N80-13130 #
BMFT-FB-W-78-37 ..... N80-13131 #
BMFT-FB-W-78-38 ..... N80-13132 #
BMFT-FB-W-78-39 ..... N80-13421 #
BMFT-FB-W-78-40 ..... N80-13147 #

BNL-NUREG-25716 ..... N80-13417 #

BNL-25759 ..... N80-13979 #
BNL-25908 ..... N80-13654 #
BNL-26075 ..... N80-13225 #
BNL-26094 ..... N80-13238 #
BNL-26191 ..... N80-13971 #
BNL-26209 ..... N80-13294 #
BNL-26211 ..... N80-13915 #
BNL-26240 ..... N80-13916 #
BNL-26282 ..... N80-13760 #
BNL-26391 ..... N80-13383 #
BNL-26482 ..... N80-13650 #
BNL-50924 ..... N80-13632 #
BNL-50944 ..... N80-13277 #
BNL-50960 ..... N80-13914 #
BNL-50968 ..... N80-13651 #
BNL-50995 ..... N80-13418 #

BR65126 ..... N80-13887 #
BR66077 ..... N80-13983 #
BR66370 ..... N80-13886 #
BR66435 ..... N80-13527 #
BR66481 ..... N80-13035 #
BR66747 ..... N80-13137 #
BR66754 ..... N80-13036 #
BR66838 ..... N80-13885 #
BR66839 ..... N80-13435 #
BR66853 ..... N80-13055 #
BR66968 ..... N80-13737 #
BR66980 ..... N80-13010 #
BR67362 ..... N80-13037 #
BR67363 ..... N80-13146 #
BR67587 ..... N80-13126 #
BR67646 ..... N80-13006 #
BR67657 ..... N80-13038 #
BR67686 ..... N80-13853 #
BR67702 ..... N80-13526 #
BR67864 ..... N80-13062 #
BR68392 ..... N80-13345 #

CAES-11 ..... N80-13687 #

CEEDO-TR-79-03 ..... N80-13048*#

CGR/DC-12/79 ..... N80-13754 #

COM-74-11499 ..... N80-13426 #

CONF-761168-SUMM ..... N80-13705 #
CONF-780970-1 ..... N80-13850 #
CONF-780976-1 ..... N80-13985 #
CONF-781053-4 ..... N80-13827 #
CONF-781113-25 ..... N80-13894 #
CONF-781186-1 ..... N80-13177 #
CONF-781198-1 ..... N80-13852 #
CONF-790236 ..... N80-13520 #
CONF-790305-7 ..... N80-13694 #
CONF-790318-4 ..... N80-13913 #
CONF-790327-7 ..... N80-13912 #
CONF-790327-96 ..... N80-13938 #
CONF-790327-150 ..... N80-13376 #
CONF-790341-8 ..... N80-13970 #
CONF-790371-1 ..... N80-13689 #
CONF-790418-6 ..... N80-13432 #
CONF-790434-5 ..... N80-13204 #
CONF-790435-2 ..... N80-13481 #
CONF-790437-11 ..... N80-13971 #
CONF-790438-2 ..... N80-13915 #
CONF-790442-1 ..... N80-13626 #
CONF-790442-12 ..... N80-13199 #

CONF-790442-13 ..... N80-13261 #
CONF-790442-17 ..... N80-13972 #
CONF-790444-2 ..... N80-13696 #
CONF-790445-5 ..... N80-13138 #
CONF-790446-3 ..... N80-13654 #
CONF-790446-6 ..... N80-13706 #
CONF-790495-1 ..... N80-13606 #
CONF-790497-2 ..... N80-13733 #
CONF-790503-2 ..... N80-13514 #
CONF-790503-5 ..... N80-13176 #
CONF-790505-15 ..... N80-13416 #
CONF-790505-17 ..... N80-13884 #
CONF-790515-3 ..... N80-13686 #
CONF-790518-1 ..... N80-13262 #
CONF-790520-3 ..... N80-13276 #
CONF-790520-4 ..... N80-13273 #
CONF-790520-6 ..... N80-13275 #
CONF-790520-7 ..... N80-13274 #
CONF-790526-2 ..... N80-13683 #
CONF-790529-4 ..... N80-13928 #
CONF-790538-1 ..... N80-13225 #
CONF-790538-6 ..... N80-13978 #
CONF-790538-8 ..... N80-13265 #
CONF-790538-9 ..... N80-13977 #
CONF-790538-14 ..... N80-13235 #
CONF-790539-1 ..... N80-13412 #
CONF-790540-3 ..... N80-13375 #
CONF-790540-9 ..... N80-13385 #
CONF-790540-11 ..... N80-13264 #
CONF-790541-3 ..... N80-13671 #
CONF-790541-24 ..... N80-13653 #
CONF-790541-54 ..... N80-13665 #
CONF-790565-1 ..... N80-13263 #
CONF-790574-1 ..... N80-13238 #
CONF-790602-54 ..... N80-13708 #
CONF-790602-69 ..... N80-13917 #
CONF-790610-2 ..... N80-13903 #
CONF-790630-9 ..... N80-13295 #
CONF-790631-1 ..... N80-13666 #
CONF-790631-2 ..... N80-13657 #
CONF-790631-3 ..... N80-13676 #
CONF-790632-1 ..... N80-13494 #
CONF-790655-5 ..... N80-13409 #
CONF-790657-2 ..... N80-13226 #
CONF-790668-1 ..... N80-13384 #
CONF-790673-2 ..... N80-13722 #
CONF-790674-3 ..... N80-13760 #
CONF-790685-1 ..... N80-13635 #
CONF-790690-1 ..... N80-13896 #
CONF-790692-1 ..... N80-13910 #
CONF-790697-1 ..... N80-14016 #
CONF-790702-1 ..... N80-13434 #
CONF-790706-1 ..... N80-13382 #
CONF-790709-8 ..... N80-13410 #
CONF-790709-10 ..... N80-13875 #
CONF-790730-2 ..... N80-13522 #
CONF-790736-1 ..... N80-13232 #
CONF-790745-1 ..... N80-13413 #
CONF-790745-2 ..... N80-13408 #
CONF-790802-1 ..... N80-13518 #
CONF-790802-15 ..... N80-13793 #
CONF-790803-9 ..... N80-13296 #
CONF-790803-19 ..... N80-13709 #
CONF-790803-21 ..... N80-13906 #
CONF-790803-23 ..... N80-13693 #
CONF-790803-27 ..... N80-13710 #
CONF-790805-3 ..... N80-13431 #
CONF-790808-6 ..... N80-13417 #
CONF-790811-1 ..... N80-13515 #
CONF-790813-2 ..... N80-13979 #
CONF-790815-2 ..... N80-13297 #
CONF-790815-9 ..... N80-13383 #
CONF-790820-2 ..... N80-13227 #
CONF-790822-1 ..... N80-13919 #
CONF-790822-5 ..... N80-13294 #
CONF-790822-7 ..... N80-13909 #
CONF-790826-2 ..... N80-13136 #
CONF-790828-2 ..... N80-13411 #
CONF-790841-1 ..... N80-13478 #
CONF-790906-10 ..... N80-13647 #
CONF-790908-1 ..... N80-13341 #
CONF-791009-3 ..... N80-13650 #
CONF-7806118 ..... N80-13681 #
CONF-7806119-1 ..... N80-14001 #
CONF-7806153-1 ..... N80-13642 #
CONF-7809102-1 ..... N80-13641 #
CONF-7905104-1 ..... N80-13517 #
CONF-7908040-1 ..... N80-13477 #

COO-1198-1267 ..... N80-13975 #
COO-1599-153-PT-1 ..... N80-13604 #
COO-2733-1 ..... N80-13231 #
COO-2733-19 ..... N80-13516 #
COO-2733-20 ..... N80-13230 #
COO-2733-21 ..... N80-13519 #
COO-2858-23 ..... N80-13668 #
COO-3084-65 ..... N80-13517 #
COO-3084-69 ..... N80-13229 #
COO-3459-14 ..... N80-13233 #
COO-3459-15 ..... N80-13227 #
COO-4072-2 ..... N80-13234 #
COO-4094-25 ..... N80-13377 #
COO-4094-53 ..... N80-13692 #
COO-4298-1 ..... N80-13278 #
COO-4376-T1 ..... N80-13378 #
COO-4381-7 ..... N80-13235 #
COO-4433-2 ..... N80-13200 #
COO-4507-4 ..... N80-13282 #
COO-4546-3 ..... N80-13672 #
COO-4557-1 ..... N80-13670 #
COO-4577-8 ..... N80-13665 #
COO-4649-4 ..... N80-13707 #
COO-4878-3 ..... N80-13694 #

CRPE-DT-1039 ..... N80-13738 #

D-270 ..... N80-14004 #
D-271 ..... N80-14005 #
D-272 ..... N80-14006 #
D-275 ..... N80-14007 #

DFVLR-FB-78-27 ..... N80-13485 #
DFVLR-FB-78-28 ..... N80-13007 #

DFVLR-MITT-78-01 ..... N80-13039 #
DFVLR-MITT-79-01 ..... N80-13794 #

DLR-FB-77-29 ..... N80-13012 #
DLR-FB-77-43 ..... N80-13059 #
DLR-FB-77-51 ..... N80-13011 #
DLR-FB-77-64 ..... N80-13022 #
DLR-FB-77-69 ..... N80-13930 #

DOE/CS-34267/1 ..... N80-13688 #
DOE/EDP-0030 ..... N80-13701 #
DOE/EIA-0184/5 ..... N80-13607 #
DOE/ER-0030 ..... N80-13582 #
DOE/ET-0012/2-REV ..... N80-13637 #
DOE/ET-0019/2 ..... N80-13691 #
DOE/ET-0078/T1 ..... N80-13662 #
DOE/ET-0100 ..... N80-13293 #
DOE/ET-0109 ..... N80-13658 #
DOE/ET-2606/4 ..... N80-13476 #
DOE/ET-4065/1 ..... N80-13711 #
DOE/ET-4065/1-VOL-2 ..... N80-13712 #
DOE/ET-4065/1-VOL-2-APP ..... N80-13713 #
DOE/ET-4065/1-VOL-3 ..... N80-13714 #
DOE/ET-5109/1 ..... N80-13371 #
DOE/ET-248447/1 ..... N80-13660 #
DOE/EV-0044 ..... N80-13279 #
DOE/EV-70031/4-PT-A/B ..... N80-13723 #
DOE/NASA/0032-79/4 ..... N80-13989 #
DOE/NASA/1044-79/4 ..... N80-13361*#
DOE/NASA/1059-79/4 ..... N80-13623*#
DOE/NASA/1062-79/3 ..... N80-13624*#
DOE/NASA/2593-79/9 ..... N80-13256*#
DOE/NASA/2593-79/10 ..... N80-13721*#
DOE/NASA/20370-79/18 ..... N80-13490*#
DOE/NASA/20485-79/5 ..... N80-13317*#
DOE/RA-23-216.00.0-02 ..... N80-13667 #
DOE/SF/10505-1 ..... N80-13663 #
DOE/TIC-10098 ..... N80-13682 #

DP-MS-78-95 ..... N80-13733 #
DP-MS-79-2 ..... N80-13917 #

DPSTD-SFHP-78-10 ..... N80-13905 #

DRDMI-H-78-1-VOL-5 ..... N80-13457 #

DREV-R-4129/78 ..... N80-13454 #

DRIC-TRANS-5572 ..... N80-13345 #

DS-R79001 ..... N80-13826 #

D6-48725 ..... N80-13986*#

D180-25037-1-VOL-1 ..... N80-13139*#
D180-25037-2-VOL-2 ..... N80-13140*#
D180-25037-3-VOL-3 ..... N80-13141*#
D180-25037-4-VOL-4 ..... N80-13142*#
D180-25037-5-VOL-5 ..... N80-13143*#
D180-25037-6-VOL-6 ..... N80-13144*#
D180-25037-7-VOL-7 ..... N80-13145*#
D180-25481-1-VOL-1 ..... N80-13043*#
D180-25481-2-VOL-2 ..... N80-13044*#
D180-25481-3-VOL-3 ..... N80-13045*#

E-119 ..... N80-13473*#
E-156 ..... N80-13268*#
E-160 ..... N80-13403*#
E-163 ..... N80-13361*#
E-192 ..... N80-13256*#
E-204 ..... N80-13317*#
E-210 ..... N80-13254*#
E-211 ..... N80-13490*#
E-215 ..... N80-13881*#
E-230 ..... N80-13159*#
E-231 ..... N80-13171*#
E-237 ..... N80-13046*#
E-248 ..... N80-13047*#
E-255 ..... N80-13404*#
E-269 ..... N80-13624*#
E-275 ..... N80-13163*#
E-284 ..... N80-13513*#

ECR-87 ..... N80-13387 #

EER-35-1-VOL-1 ..... N80-13018 #
EER-35-1-VOL-2 ..... N80-13019 #

EGG-1183-1679 ..... N80-13606 #

EOARD-TR-79-523 ..... N80-13220 #

EPA-530/SW-175C.2 ..... N80-13991 #
EPA-530/SW-175C.3 ..... N80-13992 #
EPA-530/SW-175C.4 ..... N80-13993 #

EPRI-AF-1084 ..... N80-13292 #

EPRI-EL-849-VOL-3 ..... N80-13381 #

EPRI-EM-1059 ..... N80-13659 #
EPRI-EM-1134 ..... N80-13646 #

EPRI-ER-978-VOL-3 ..... N80-13628 #
EPRI-ER-1095-SR ..... N80-13703 #

EPRI-FP-1060 ..... N80-13483 #

EPRI-NP-1043 ..... N80-13525 #

ESA-SP-142 ..... N80-13069 #
ESA-SP-148 ..... N80-13529 #

ESA-TT-503-REV ..... N80-13059 #
ESA-TT-508-REV ..... N80-13011 #
ESA-TT-516-REV ..... N80-13012 #
ESA-TT-527-REV ..... N80-13022 #
ESA-TT-530-REV ..... N80-13930 #

ESD-TR-79-156 ..... N80-13822 #

ETS-46 ..... N80-13822 #

E80-10001 ..... N80-13587*#
E80-10009 ..... N80-13588*#
E80-10010 ..... N80-13589*#
E80-10011 ..... N80-13590*#
E80-10012 ..... N80-13591*#
E80-10013 ..... N80-13592*#
E80-10014 ..... N80-13593*#
E80-10015 ..... N80-13594*#
E80-10016 ..... N80-13595*#
E80-10017 ..... N80-13596*#
E80-10018 ..... N80-13597*#
E80-10019 ..... N80-13598*#
E80-10021 ..... N80-13599*#
E80-10024 ..... N80-13600*#

FAA-AM-79-17 ..... N80-13014 #

FAA-ASP-78-5 ..... N80-13057 #
FAA-ASP-78-7 ..... N80-13016 #

FAA-NA-79-2 ..... N80-13253 #
FAA-NA-79-30 ..... N80-13042 #

FAA-RD-78-112-VOL-1 ..... N80-13018 #
FAA-RD-78-112-VOL-2 ..... N80-13019 #
FAA-RD-79-67 ..... N80-13042 #

FB-34 ..... N80-13775 #
FB-37 ..... N80-13776 #
FB-38 ..... N80-13777 #
FB-39 ..... N80-13795 #
FB-40 ..... N80-13778 #
FB-41 ..... N80-13779 #
FB-42 ..... N80-13780 #

FDRC-3160-12-78 ..... N80-13051 #

FE-1207-62 ..... N80-13288 #
FE-1800-30 ..... N80-13291 #
FE-1800-33 ..... N80-13287 #
FE-2247-22 ..... N80-13289 #
FE-2286-32 ..... N80-13281 #
FE-2307-46 ..... N80-13280 #
FE-2495-T13-VOL-2 ..... N80-13724 #
FE-2606-5 ..... N80-13484 #

FR-79-13/AS ..... N80-13257*#
FR-79-92-1187 ..... N80-13359*#
FR-11453 ..... N80-13475 #

GA-A-15148 ..... N80-13415 #
GA-A-15270 ..... N80-13178 #
GA-A-15333 ..... N80-13521 #

GARP-SPEC-REPT-30 ..... N80-13748 #

GC-TR-79-1036 ..... N80-13270 #

GEPP-OP-405 ..... N80-13138 #

GL-2819 ..... N80-13923*#

GPO-25-887 ..... N80-13315 #
GPO-38-212 ..... N80-13988 #

H-1111 ..... N80-13027*#

HAC-E07711 ..... N80-13359*#

HAC-REF-E3804 ..... N80-13335 #

HCP/I6346-01/1-VOL-1 ..... N80-13633 #
HCP/M2098-03 ..... N80-13283 #
HCP/T1041-01 ..... N80-13745 #
HCP/T2898-01/3 ..... N80-13656 #
HCP/T4016-01/2 ..... N80-13747 #

HDL-CR-79-056-1 ..... N80-13368 #

HEDL-TME-78-80 ..... N80-13198 #

IN-79-EH-05 ..... N80-13151*#

INPE-1481-RPE/028 ..... N80-13587*#

IS-M-211 ..... N80-13514 #

IS-4655 ..... N80-13679 #
IS-4703 ..... N80-13702 #

ISBN-0-85518132-X ..... N80-13853 #
ISBN-2-7170-0529-3 ..... N80-13056 #
ISBN-2-7170-0531-5 ..... N80-13423 #
ISBN-2-7170-0532-3 ..... N80-13424 #
ISBN-2-7170-0535-5 ..... N80-13008 #
ISBN-2-7170-0538-2 ..... N80-13009 #

ISSN-0340-8922 ..... N80-14008 #

IWR-RR-79-R1 ..... N80-13602 #

JSC-14744 ..... N80-13593*#
JSC-14745 ..... N80-13594*#
JSC-14765 ..... N80-13151*#
JSC-14785 ..... N80-13596*#
JSC-14822 ..... N80-13149*#
JSC-14852 ..... N80-13595*#
JSC-15042 ..... N80-13591*#

JSC-16019 ..... N80-13590*#
JSC-16020 ..... N80-13589*#
JSC-16029 ..... N80-13840*#
JSC-16030-REV-D ..... N80-13592*#
JSC-16080 ..... N80-13841*#
JSC-16193 ..... N80-13815*#
JSC-16238 ..... N80-13134*#
JSC-16248 ..... N80-13148*#
JSC-16253 ..... N80-13816*#

JTCG/AS-76-T-006 ..... N80-13196 #

JTR-79-06 ..... N80-13337 #

KNNI-97-129 ..... N80-13750 #
KNNI-141-26 ..... N80-13749 #

L-12731 ..... N80-13191*#
L-12811 ..... N80-12997*#
L-12921 ..... N80-13135*#
L-13009 ..... N80-12995*#
L-13028 ..... N80-13024*#
L-13053 ..... N80-13512*#
L-13074 ..... N80-13020*#
L-13143 ..... N80-13026*#
L-13149 ..... N80-13000*#
L-13157 ..... N80-12994*#
L-13165 ..... N80-13730*#
L-13167 ..... N80-13879*#
L-13181 ..... N80-13880*#
L-13222 ..... N80-13430*#
L-13224 ..... N80-13001*#
L-13233 ..... N80-13769*#
L-13239 ..... N80-13013*#
L-13240 ..... N80-12999*#
L-13243 ..... N80-13052*#
L-13250 ..... N80-13025*#
L-13259 ..... N80-13152*#
L-13270 ..... N80-13002*#
L-13329 ..... N80-13429*#
L-13355 ..... N80-13402*#
L-13366 ..... N80-13438*#

LA-UR-78-2395 ..... N80-13850 #
LA-UR-79-621 ..... N80-13297 #
LA-UR-79-1115 ..... N80-13296 #
LA-UR-79-1242 ..... N80-13906 #
LA-UR-79-1321 ..... N80-13515 #
LA-UR-79-1474 ..... N80-13928 #
LA-UR-79-1524 ..... N80-13896 #
LA-UR-79-1599 ..... N80-13653 #
LA-UR-79-1752 ..... N80-13913 #
LA-UR-79-2039 ..... N80-13875 #
LA-UR-79-2040 ..... N80-13973 #

LA-7532-MS ..... N80-13460 #
LA-7807-HDR ..... N80-13673 #
LA-7820-PR ..... N80-13690 #
LA-7821-MS ..... N80-13677 #
LA-7850-T ..... N80-13927 #
LA-7909-MS ..... N80-13634 #
LA-7926-MS ..... N80-13167 #
LA-7952-PR ..... N80-13911 #

LARS-071579 ..... N80-13588*#

LBL-5683 ..... N80-13767 #
LBL-7883 ..... N80-13648 #
LBL-8410 ..... N80-13376 #
LBL-8482 ..... N80-13239 #
LBL-8621 ..... N80-13997 #
LBL-8891 ..... N80-13938 #
LBL-8925 ..... N80-13680 #
LBL-9022 ..... N80-13907 #
LBL-9034 ..... N80-13206 #
LBL-9214 ..... N80-14015 #
LBL-9257 ..... N80-13976 #
LBL-9260 ..... N80-13236 #
LBL-9264 ..... N80-13228 #
LBL-9316 ..... N80-13897 #
LBL-9323 ..... N80-13722 #
LBL-9374 ..... N80-14016 #
LBL-9423 ..... N80-13477 #

LC-79-18506 ..... N80-13839*#

LEC-3949-REV-D ..... N80-13592*#
LEC-12723 ..... N80-13595*#
LEC-12980 ..... N80-13593*#
LEC-13012 ..... N80-13594*#
LEC-13067 ..... N80-13189*#
LEC-13230 ..... N80-13151*#
LEC-13258 ..... N80-13596*#
LEC-13456 ..... N80-13591*#
LEC-13482 ..... N80-13590*#
LEC-13632 ..... N80-13589*#
LEC-13703 ..... N80-13815*#
LEC-14055 ..... N80-13816*#

LIDS-P-931 ..... N80-13338 #

LMSC-D626480 ..... N80-13170*#

LOG-C3719 ..... N80-13023 #

LTR-ST-1118 ..... N80-13511 #

MAE-1445 ..... N80-13271 #

MBB-URV-101(77) ..... N80-13128 #

MDC-E2052 ..... N80-13922*#

MDC-G6275 ..... N80-13064*#
MDC-G6579 ..... N80-13065*#
MDC-G7399-VOL-1 ..... N80-13700 #

MDC-Q0673 ..... N80-13173 #

METC-8089-T4 ..... N80-13290 #

METC/CR-78/10 ..... N80-13414 #
METC/CR-79/22 ..... N80-13735 #

MLM-2556(TR) ..... N80-13284 #

MMS-79-10 ..... N80-13834 #
MMS-79-13 ..... N80-13864 #
MMS-79-16 ..... N80-13869 #
MMS-1226 ..... N80-13847 #
MMS-1237 ..... N80-13848 #

MPI-PAE/EXTRATERR-154 ..... N80-14008 #

MPR-2 ..... N80-13160*#
MPR-92 ..... N80-13288 #

MRL-R-726 ..... N80-13194 #

MRL-TN-418 ..... N80-13168 #

MTI-79ASE77RE2 ..... N80-13989 #

NADC-77024-30 ..... N80-13033 #
NADC-79010-60 ..... N80-13772 #

NASA-CP-2101 ..... N80-13152*#
NASA-CP-2107 ..... N80-13438*#

NASA-CR-3179 ..... N80-13488*#
NASA-CR-3180 ..... N80-13489*#
NASA-CR-3181 ..... N80-13878*#
NASA-CR-3189 ..... N80-13170*#
NASA-CR-3191 ..... N80-12996*#
NASA-CR-3207 ..... N80-13742*#
NASA-CR-145284 ..... N80-12998*#
NASA-CR-152269 ..... N80-13427*#
NASA-CR-156858 ..... N80-13753*#
NASA-CR-159126 ..... N80-13986*#
NASA-CR-159139 ..... N80-13028*#
NASA-CR-159160 ..... N80-13053*#
NASA-CR-159493 ..... N80-13218*#
NASA-CR-159535 ..... N80-13048*#
NASA-CR-159597 ..... N80-13474*#
NASA-CR-159631 ..... N80-13989*#
NASA-CR-159659 ..... N80-13362*#
NASA-CR-159665 ..... N80-13257*#
NASA-CR-159668 ..... N80-13882*#
NASA-CR-159688 ..... N80-13158*#
NASA-CR-159691 ..... N80-13043*#
NASA-CR-159692 ..... N80-13044*#
NASA-CR-159693 ..... N80-13045*#
NASA-CR-159732 ..... N80-13193*#
NASA-CR-159733 ..... N80-13164*#
NASA-CR-159734 ..... N80-13165*#
NASA-CR-160286 ..... N80-13063*#
NASA-CR-160312 ..... N80-13588*#
NASA-CR-160313 ..... N80-13595*#

NASA-CR-160314 ..... N80-13590*#
NASA-CR-160315 ..... N80-13589*#
NASA-CR-160338 ..... N80-13591*#
NASA-CR-160339 ..... N80-13592*#
NASA-CR-160340 ..... N80-13593*#
NASA-CR-160341 ..... N80-13594*#
NASA-CR-160342 ..... N80-13596*#
NASA-CR-160363 ..... N80-14003*#
NASA-CR-160370 ..... N80-13139*#
NASA-CR-160371 ..... N80-13140*#
NASA-CR-160372 ..... N80-13141*#
NASA-CR-160373 ..... N80-13142*#
NASA-CR-160374 ..... N80-13143*#
NASA-CR-160375 ..... N80-13144*#
NASA-CR-160376 ..... N80-13145*#
NASA-CR-160390 ..... N80-13064*#
NASA-CR-160391 ..... N80-13065*#
NASA-CR-160392 ..... N80-13922*#
NASA-CR-160394 ..... N80-13815*#
NASA-CR-160395 ..... N80-13816*#
NASA-CR-160396 ..... N80-13360*#
NASA-CR-160397 ..... N80-13757*#
NASA-CR-160398 ..... N80-13622*#
NASA-CR-160399 ..... N80-13758*#
NASA-CR-160400 ..... N80-13472*#
NASA-CR-160401 ..... N80-13759*#
NASA-CR-160402 ..... N80-13770*#
NASA-CR-160403 ..... N80-13771*#
NASA-CR-160404 ..... N80-13334*#
NASA-CR-160407 ..... N80-13151*#
NASA-CR-160409 ..... N80-13405*#
NASA-CR-160410 ..... N80-13401*#
NASA-CR-160411 ..... N80-13149*#
NASA-CR-161336 ..... N80-13783*#
NASA-CR-161337 ..... N80-13359*#
NASA-CR-161338 ..... N80-13160*#
NASA-CR-161342 ..... N80-13161*#
NASA-CR-161343 ..... N80-13162*#
NASA-CR-161346 ..... N80-13066*#
NASA-CR-161347 ..... N80-13067*#
NASA-CR-161348 ..... N80-13068*#
NASA-CR-161349 ..... N80-13316*#
NASA-CR-162266 ..... N80-13923*#
NASA-CR-162378 ..... N80-13587*#
NASA-CR-162390 ..... N80-13597*#
NASA-CR-162391 ..... N80-13598*#
NASA-CR-162393 ..... N80-13599*#
NASA-CR-162396 ..... N80-13600*#
NASA-CR-162499 ..... N80-13731*#
NASA-CR-162504 ..... N80-13319*#
NASA-CR-162505 ..... N80-13744*#
NASA-CR-162508 ..... N80-13058*#
NASA-CR-162509 ..... N80-13814*#
NASA-CR-162511 ..... N80-13982*#
NASA-CR-162512 ..... N80-13004*#
NASA-CR-162514 ..... N80-14002*#
NASA-CR-162520 ..... N80-13621*#

NASA-SP-437 ..... N80-13839*#
NASA-SP-7011(199) N80-13762*
NASA-SP-7041(23) N80-13585*

NASA-TM-78178 ..... N80-13192*#
NASA-TM-78226 ..... N80-13601*#
NASA-TM-78241 ..... N80-13258*#
NASA-TM-78617 ..... N80-13255*#
NASA-TM-79224 ..... N80-13473*#
NASA-TM-79248 ..... N80-13317*#
NASA-TM-79250 ..... N80-13403*#
NASA-TM-79252 ..... N80-13361*#
NASA-TM-79272 ..... N80-13256*#
NASA-TM-79275 ..... N80-13623*#
NASA-TM-79277 ..... N80-13254*#
NASA-TM-79279 ..... N80-13881*#
NASA-TM-79284 ..... N80-13490*#
NASA-TM-79285 ..... N80-13268*#
NASA-TM-79287 ..... N80-13159*#
NASA-TM-79288 ..... N80-13171*#
NASA-TM-79293 ..... N80-13046*#
NASA-TM-79296 ..... N80-13721*#
NASA-TM-79297 ..... N80-13047*#
NASA-TM-79303 ..... N80-13404*#
NASA-TM-79313 ..... N80-13624*#
NASA-TM-79319 ..... N80-13163*#
NASA-TM-80145 ..... N80-12997*#
NASA-TM-80171 ..... N80-13000*#
NASA-TM-80172 ..... N80-13429*#
NASA-TM-80191 ..... N80-12999*#
NASA-TM-80546 ..... N80-13150*#
NASA-TM-80778 ..... N80-13851*#
NASA-TM-80835 ..... N80-13134*#
NASA-TM-80836 ..... N80-13841*#
NASA-TM-80837 ..... N80-13148*#
NASA-TM-80839 ..... N80-13840*#
NASA-TM-81154 ..... N80-13041*#
NASA-TM-81155 ..... N80-13333*#
NASA-TM-81157 ..... N80-13003*#
NASA-TM-81158 ..... N80-12991*#
NASA-TM-81346 ..... N80-13863*#
NASA-TM-81347 ..... N80-13027*#
NASA-TM-81379 ..... N80-13513*#

NASA-TP-1448 ..... N80-13191*#
NASA-TP-1535 ..... N80-12994*#
NASA-TP-1536 ..... N80-12995*#
NASA-TP-1540 ..... N80-13024*#
NASA-TP-1554 ..... N80-13135*#
NASA-TP-1555 ..... N80-13025*#
NASA-TP-1569 ..... N80-13013*#
NASA-TP-1572 ..... N80-13430*#
NASA-TP-1574 ..... N80-13020*#
NASA-TP-1576 ..... N80-13880*#
NASA-TP-1577 ..... N80-13879*#
NASA-TP-1578 ..... N80-13512*#
NASA-TP-1579 ..... N80-13001*#
NASA-TP-1587 ..... N80-13730*#
NASA-TP-1589 ..... N80-13026*#
NASA-TP-1590 ..... N80-13769*#
NASA-TP-1592 ..... N80-13002*#
NASA-TP-1594 ..... N80-13052*#
NASA-TP-1595 ..... N80-13402*#

NBSIR-79-1604 ..... N80-13319*#

NEL-659 ..... N80-13422 #
NEL-660 ..... N80-13061 #
NEL-661 ..... N80-13242 #
NEL-662 ..... N80-13318 #

NGTE-R-78007 ..... N80-13887 #

NOAA-TR-NWS-1007-1 ..... N80-13746 #

NOSC/TR-423 ..... N80-13846 #

NPL-DNACS-1/78 ..... N80-13343 #

NRL-MR-3953 ..... N80-13456 #
NRL-MR-4013 ..... N80-13744 #
NRL-MR-4044 ..... N80-13166 #
NRL-MR-4055 ..... N80-13823 #

NRTC-78-47R ..... N80-13032 #

NSS-SFDS-RP015 ..... N80-13068*#

NTIS/PS-75/643 ..... N80-13426 #
NTIS/PS-76/0463 ..... N80-13719 #
NTIS/PS-76/0465 ..... N80-13720 #
NTIS/PS-76/0740 ..... N80-13426 #
NTIS/PS-77/0561 ..... N80-13715 #
NTIS/PS-77/0562 ..... N80-13716 #
NTIS/PS-77/0563 ..... N80-13719 #
NTIS/PS-77/0565 ..... N80-13720 #
NTIS/PS-77/0674 ..... N80-13614 #
NTIS/PS-77/0675 ..... N80-13615 #
NTIS/PS-77/0676 ..... N80-13612 #
NTIS/PS-77/0711 ..... N80-13388 #
NTIS/PS-77/0712 ..... N80-13389 #
NTIS/PS-77/0798 ..... N80-13426 #
NTIS/PS-78/0664 ..... N80-13715 #
NTIS/PS-78/0665 ..... N80-13716 #
NTIS/PS-78/0666 ..... N80-13719 #
NTIS/PS-78/0667 ..... N80-13720 #
NTIS/PS-78/0789 ..... N80-13614 #
NTIS/PS-78/0790 ..... N80-13615 #
NTIS/PS-78/0791 ..... N80-13612 #
NTIS/PS-78/0821 ..... N80-13388 #
NTIS/PS-78/0822 ..... N80-13389 #
NTIS/PS-78/0824 ..... N80-13426 #
NTIS/PS-79/0814/8 ..... N80-13715 #
NTIS/PS-79/0815/5 ..... N80-13716 #
NTIS/PS-79/0816/3 ..... N80-13717 #
NTIS/PS-79/0817/1 ..... N80-13719 #
NTIS/PS-79/0818/9 ..... N80-13718 #
NTIS/PS-79/0819/7 ..... N80-13720 #
NTIS/PS-79/0822/1 ..... N80-13613 #
NTIS/PS-79/0842/9 ..... N80-13614 #

NTIS/PS-79/0843/7 ..... N80-13615 #
NTIS/PS-79/0844/5 ..... N80-13612 #
NTIS/PS-79/0851/0 ..... N80-13425 #
NTIS/PS-79/0852/8 ..... N80-13426 #
NTIS/PS-79/0870/0 ..... N80-13388 #
NTIS/PS-79/0871/8 ..... N80-13389 #
NTIS/PS-79/0875/9 ..... N80-13040 #

NUREG-CR-0767 ..... N80-13524 #
NUREG-CR-0832 ..... N80-13407 #
NUREG-CR-0910 ..... N80-13883 #

ORNL/CSD-39 ..... N80-13639 #
ORNL/CSD/TM-64 ..... N80-13849 #
ORNL/NUREG-57 ..... N80-13524 #
ORNL/NUREG/CSD/TM-8 ..... N80-13407 #
ORNL/PPA-79/2 ..... N80-13605 #
ORNL/SUB-7525/2 ..... N80-13664 #
ORNL/TM-6584 ..... N80-13939 #
ORNL/TM-6705 ..... N80-13240 #
ORNL/TM-6845 ..... N80-13944 #
ORNL/TM-6934 ..... N80-13631 #

ORO-5126-57 ..... N80-13851*#
ORO-5773-T1 ..... N80-13197 #

OSU-FPRC-9MI ..... N80-13493 #

OSU-TR-186 ..... N80-13868 #

OUEL-1280/79 ..... N80-13241 #
OUEL-1284/79 ..... N80-13436 #

PB-296321/1 ..... N80-13319*#
PB-297871/6 ..... N80-13991 #
PB-297872/4 ..... N80-13992 #
PB-297873/2 ..... N80-13993 #

PD79-18 ..... N80-13063*#

POLY-EE-78-052 ..... N80-13819 #

PR-1 ..... N80-13598*#
PR-2 ..... N80-13990 #
PR-441 ..... N80-14000 #
PR-450 ..... N80-13998 #

PRRL-78-CR-42 ..... N80-13670 #

QPR-10 ..... N80-13277 #

QR-1 ..... N80-13272 #
QR-1 ..... N80-13621*#
QR-3 ..... N80-13280 #
QR-4 ..... N80-13476 #
QR-5 ..... N80-13484 #

QTPR-4 ..... N80-13282 #

R-1568 ..... N80-13029 #

RADC-TR-79-101 ..... N80-13339 #
RADC-TR-79-117 ..... N80-13364 #
RADC-TR-79-137 ..... N80-13984 #
RADC-TR-79-165 ..... N80-13363 #
RADC-TR-79-173 ..... N80-13826 #
RADC-TR-79-187 ..... N80-13792 #
RADC-TR-79-188 ..... N80-13819 #
RADC-TR-79-200 ..... N80-13491 #
RADC-TR-79-203 ..... N80-13175 #
RADC-TR-79-220 ..... N80-13336 #

RAE-AERO-3440 ..... N80-13886 #
RAE-AERO-3444 ..... N80-13010 #
RAE-AERO-3447 ..... N80-13062 #

RAE-MATH-COMP-233 ..... N80-13983 #

RAE-SPACE-557 ..... N80-13137 #
RAE-SPACE-558 ..... N80-13146 #
RAE-SPACE-560 ..... N80-13737 #

RAE-STRUCT-BF/B/0777 ..... N80-13038 #

RAE-STRUCT-YSE/B/0778 ..... N80-13037 #

RAE-TM-IT-179 ..... N80-13435 #

RAE-TM-SPACE-271 ..... N80-13126 #

RAE-TM-STRUCT-933 ..... N80-13035 #
RAE-TM-STRUCT-940 ..... N80-13527 #
RAE-TM-STRUCT-941 ..... N80-13036 #
RAE-TM-STRUCT-942 ..... N80-13055 #

RAE-TR-78080 ..... N80-13983 #
RAE-TR-78100 ..... N80-13886 #
RAE-TR-78107 ..... N80-13137 #
RAE-TR-78112 ..... N80-13146 #
RAE-TR-78119 ..... N80-13010 #
RAE-TR-78142 ..... N80-13737 #
RAE-TR-79002 ..... N80-13062 #
RAE-TR-79010 ..... N80-13037 #
RAE-TR-79011 ..... N80-13038 #

REPT-78-115 ..... N80-13945 #
REPT-79-FM-26-REV-1 ..... N80-13840*#
REPT-79-FM-32 ..... N80-13841*#
REPT-79-FM-43 ..... N80-13134*#
REPT-79-FM-44 ..... N80-13148*#
REPT-79-556 ..... N80-13758*#
REPT-289 ..... N80-13731*#
REPT-1003 ..... N80-13616 #
REPT-1631 ..... N80-13386 #
REPT-33205F ..... N80-13162*#
REPT-64351-1 ..... N80-13924 #

RFP-2896 ..... N80-13626 #

RI/LAD-HA-79-64 ..... N80-13030 #
RI/RD79-278 ..... N80-13161*#

RLO-2227-T31-4-PT-A/B ..... N80-13723 #

RR-166 ..... N80-13791 #

R79AEG625 ..... N80-13474*#
R7911-5 ..... N80-13334*#

SAI-79-100-DEN ..... N80-13821 #

SAMSO-TR-79-52 ..... N80-13406 #

SAN-115/136-1 ..... N80-13203 #
SAN-0034/263-1 ..... N80-13683 #
SAN-0113-T3 ..... N80-13678 #
SAN-1011/119 ..... N80-13734 #
SAN-1605/7-VOL-1 ..... N80-13700 #

SAND-78-1177 ..... N80-13642 #
SAND-78-1409 ..... N80-13433 #
SAND-78-1540 ..... N80-13369 #
SAND-78-1803 ..... N80-13201 #
SAND-78-1842C ..... N80-13262 #
SAND-78-1911 ..... N80-13974 #
SAND-78-2022 ..... N80-13829 #
SAND-78-2026 ..... N80-13901 #
SAND-78-2163C ..... N80-13693 #
SAND-78-2303C ..... N80-13709 #
SAND-78-2305C ..... N80-13710 #
SAND-78-2333 ..... N80-13370 #
SAND-78-7022 ..... N80-13644 #
SAND-78-7038-VOL-1 ..... N80-13704 #
SAND-78-7067 ..... N80-13342 #
SAND-79-0366 ..... N80-13419 #
SAND-79-0441 ..... N80-13462 #
SAND-79-0514 ..... N80-13645 #
SAND-79-0527C ..... N80-13176 #
SAND-79-0646C ..... N80-13382 #
SAND-79-0678 ..... N80-13876 #
SAND-79-0721 ..... N80-13479 #
SAND-79-0814 ..... N80-13684 #
SAND-79-0868C ..... N80-13431 #
SAND-79-0890C ..... N80-13375 #
SAND-79-0930C ..... N80-13494 #
SAND-79-0968 ..... N80-13202 #
SAND-79-0972 ..... N80-13373 #
SAND-79-0975 ..... N80-13732 #
SAND-79-1053C ..... N80-13671 #
SAND-79-1113C ..... N80-13909 #
SAND-79-1365C ..... N80-13136 #
SAND-79-1400 ..... N80-13272 #
SAND-79-1669C ..... N80-13640 #
SAND-79-7017 ..... N80-13675 #
SAND-79-7021 ..... N80-13697 #
SAND-79-7040 ..... N80-13661 #
SAND-79-7044 ..... N80-13940 #
SAND-79-8014 ..... N80-13482 #

SAND-79-8022 ..... N80-13005 #
SAND-79-8183 ..... N80-13698 #
SAND-79-8210 ..... N80-13725 #
SAND-79-8612 ..... N80-13204 #

SCIENTIFIC-4 ..... N80-13364 #

SC5158.2FR ..... N80-13365 #

SERI/PR-13-054 ..... N80-13674 #
SERI/TP-35-300 ..... N80-13635 #
SERI/TP-53-114R ..... N80-13649 #
SERI/TR-35-047 ..... N80-13669 #
SERI/TR-54-066 ..... N80-13699 #

SLAC-PUB-2226 ..... N80-13904 #
SLAC-PUB-2334 ..... N80-13903 #

SP79-MSFC-2391 ..... N80-13066*#
SP79-MSFC-2392 ..... N80-13067*#

SRD-79-123 ..... N80-13259 #

SRI-TR-3 ..... N80-13340 #

SU-TR-38 ..... N80-13865 #
SU-TR-39 ..... N80-13845 #
SU-TR-51 ..... N80-13833 #
SU-TR-85 ..... N80-13833 #

SWRI-02-4563-2 ..... N80-13269 #

TID-28846 ..... N80-13285 #
TID-28849 ..... N80-13286 #
TID-29418 ..... N80-13655 #
TID-29443 ..... N80-13695 #

TIR-741-LSP-8024 ..... N80-13759*#
TIR-741-MED-7018 ..... N80-13770*#
TIR-782-LSP-7006 ..... N80-13771*#

TQPR-2 ..... N80-13678 #

TR-A-10 ..... N80-13866 #
TR-A-11 ..... N80-13867 #

TR-2 ..... N80-13221 #
TR-3 ..... N80-13222 #
TR-22.2260 ..... N80-13455 #
TR-50 ..... N80-13969 #
TR-51 ..... N80-13968 #
TR-79-3 ..... N80-13842 #
TR-79-4 ..... N80-13843 #
TR-0079(4550-73)-1 ..... N80-13406 #
TR-1080-1779 ..... N80-13360*#

TREE-1365 ..... N80-13627 #

TRITA-HFL-0022 ..... N80-13528 #

TRW-33572-6001-RU-00 ..... N80-13362*#
TRW-35515-6002-RU-00 ..... N80-13622*#

TUM-MITT-147 ..... N80-13583 #

UCID-18037-79-2 ..... N80-13990 #
UCID-18049 ..... N80-13379 #
UCID-18197 ..... N80-13918 #
UCID-18227 ..... N80-13943 #
UCID-18228 ..... N80-13942 #
UCID-18236 ..... N80-13372 #

UCRL-15018 ..... N80-13920 #
UCRL-15045 ..... N80-13652 #
UCRL-52434-VOL-5 ..... N80-13374 #
UCRL-52654 ..... N80-13461 #
UCRL-52754 ..... N80-13638 #
UCRL-52758 ..... N80-13480 #
UCRL-52787 ..... N80-13523 #
UCRL-52815 ..... N80-13895 #
UCRL-81118 ..... N80-13985 #
UCRL-81230 ..... N80-13852 #
UCRL-81272 ..... N80-13177 #
UCRL-81309 ..... N80-13908 #
UCRL-81758 ..... N80-14001 #
UCRL-81931 ..... N80-13793 #
UCRL-81947 ..... N80-13894 #
UCRL-82121 ..... N80-13341 #
UCRL-82127 ..... N80-13410 #
UCRL-82134 ..... N80-13385 #
UCRL-82270 ..... N80-13411 #
UCRL-82709 ..... N80-13263 #
UCRL-83012 ..... N80-13647 #

USARIEM-T-2/79 ..... N80-13765 #

USARTL-TR-79-10 ..... N80-13032 #
USARTL-TR-79-16 ..... N80-13029 #

USCAE-53-4514-1787 ..... N80-13817 #
USCAE-53-4514-1792 ..... N80-13817 #

USCG-D-26-79 ..... N80-13764 #
USCG-D-29-79 ..... N80-13766 #
USCG-D-46-79 ..... N80-13754 #

UTEC-79-081 ..... N80-13996 #

UVA/525324/MS79/102 ..... N80-13367 #

WHOI-79-65-VOL-18 ..... N80-13755 #

Y-2184 ..... N80-13380 #

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